THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

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See engravings on page 148, vol. II.

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For engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, page 245. Address the Patentee. JOHN P. KENNEDY, Trenton, N. J.

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See also certificates from Cincinnati, O., and Louisville, Ky. Gas-Works in same number, page 208. Address, JOHN WALTON,
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Messrs. ELLIMAN BROTHERS, New York.
F. T. WILLIS, Esq., Pres. Savannah Gas Co.
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W. C. STREET, Esq., Sec. Norwalk, Ct. Gas Co.

WATER-METERS.

H. R. WORTHINGTON'S PATENT Water-Meter.—This Meter combines accuracy, simplicity and remarkable durability, with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.

HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

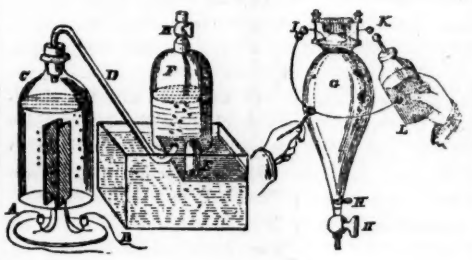
LECTURE IV.

Products: Water from the Combustion—Nature of Water—A Compound—Hydrogen.

I see you are not tired of the candle yet, or I am sure you would not be interested in the subject in the way you are. When our candle was burning we found it produced water exactly like the water we have around us; and by further examination of this water we found in it that curious body, hydrogen—that light substance of which there is some in this jar. We afterward saw the burning powers of that hydrogen, and that it produced water. And I think I introduced to your notice an apparatus which I very briefly said was an arrangement of chemical force, or power, or energy, so adjusted as to convey its power to us in these wires; and I said I should use that force to pull the water to pieces, to see what else there was in the water besides hydrogen; because, you remember, when we passed the water through the iron tube, we by no means got the weight of water back which we put in in the form of steam, though we had a very large quantity of gas evolved. We have now to see what is the other substance present. That you may understand the character and use of this instrument, let us make an experiment or two. Let us put together, first of all, some substances, knowing what they are, and then see what that instrument does to them. There is some copper (observe the various changes which it can undergo), and here is some nitric acid, and you will find that this, being a strong chemical agent, will act very much when I add it to the copper. It is now sending forth a beautiful red vapor; but as we do not want that vapor, Mr. Anderson will hold it near the chimney for a short time, that we may have the use and beauty of the experiment without the annoyance. The copper which I have put into the flask will dissolve; it will change the acid and the water into a blue fluid containing copper and other things, and I purpose then showing you how this voltaic battery deals with it; and in the meantime we will arrange another kind of experiment for you to see what power it has. This is a substance which is to us like water—that is to say, it contains bodies which we do not know of as yet, as water contains a body which we do not know as yet. Now, this solution of a salt I will put upon paper and spread about, and apply the power of the battery to it, and observe what will happen. Three or four important things will happen which we shall take advantage of. I place this wetted paper upon a sheet of tin foil, which is convenient for keeping all clean, and also for the advantageous application of the power; and this solution, you see, is not at all affected by being put upon paper or tin foil, nor by anything else I have brought in contact with it, and which, therefore, is free to us to use as regards that instrument. But first let us see that our instrument is in order. Here are our wires. Let us see whether it is in the state in which it was last time. We can soon tell. As yet, when I bring them together, we have no power, because the conveyors—what we call the electrodes—the passage or ways for the electricity—are stopped; but now Mr. Anderson by that [referring to a sudden flash at the ends of the wires] has given me a telegram to say that it is ready. Before I begin our experiment I will get Mr. Anderson to break contact again at the battery behind me, and we will put a platinum wire across to connect the poles, and then if I find I can ignite a pretty good length of this wire we shall be safe in our experiment. Now you will see the power. [The connection was established and the intermediate wire became red hot.] There is the power running beautifully through the wire, which I have made thin on purpose to show you that we have those powerful forces; and now, having that power, we will proceed with it to the examination of water.

I have here two pieces of platinum, and if I lay them down upon this piece of paper [the moistened paper on the tin foil] you will see no action; and if I take them up, there is no change that you can see, but the arrangement remains just as it was before. But now see what happens; if I take these two poles and put either one or the other of them down separately on the platinum plates, they do nothing for me, both are perfectly without action; but if I let them both be in contact at the same moment, see what happens [a brown spot appeared under each pole of the battery]. Look here at the effect that takes place, and see how I have pulled something apart from the white—something brown; and I have no doubt if I were to arrange this, and were to put one of the poles to the tinfoil on the other side of the paper, why, I get such a beautiful action upon the paper, that I am going to see whether I cannot write with it—a telegram, if you please [the lecturer here traced the word "juvenile" on the paper with one of the terminal wires]. See there how beautifully we can get our results.

You see we have here drawn something, which we have not known about before, out of this solution. Let us now take that flask from Mr. Anderson's hands, and see what we can draw out of that. This, you know, is a liquid which we have just made up from copper and nitric acid, whilst our other experiments were in hand, and though I am making this experiment very



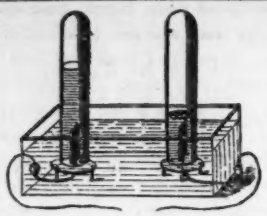
hastily, and may bungle a little, yet I prefer to let you see what I do rather than prepare it beforehand.

Now see what happens. These two platinum plates are the two ends (or I will make them so immediately) of this apparatus; and I am about to put them in contact with that solution, just as we did a moment ago on the paper. It does not matter to us whether the solution be on the paper or whether it be in the jar, so long as we bring the ends of the apparatus to it. If I put the two platinums in by themselves, they come out as clean and as white as they go in [inserting them into the fluid without connecting them with the battery]; but when we take the power and lay that on [the platinums were connected with the battery and again dipped into the solution], this, you see [exhibiting one of the platinums] is at once turned into copper, as it were; it has become like a plate of copper; and that [exhibiting the other piece of platinum] has come out quite clean. If I take this coppered piece and change sides, the copper will leave the right-hand side and come over to the left-hand side; what was before the coppered side comes out clean, and the plate which was clean comes out coated with copper; and you thus see that what copper we put into this solution we can also take out of it by means of this instrument.

Putting that solution aside, let us now see what effect this instrument will have upon water. Here are two little platinum plates which I intend to make the ends of the battery, and this, C, is a little vessel so shaped as to enable me to take it to pieces, and show you its construction. In these two cups, A and B, I pour mercury, which touches the ends of the wires connected with the platinum plates. In the vessel, C, I pour some water containing a little acid (but which is put only for the purpose of facilitating the action—it undergoes no change in the process), and connected with the top of the vessel is a bent glass tube, D, which may remind you of the pipe which was connected with the gun-barrel in our furnace experiment, and which now passes under the jar, F. I have now adjusted this apparatus, and we will proceed to affect the water in some way or other. In the other case, I sent the water through a tube which was made red hot; I am now going to pass the electricity through the inside of this vessel. Perhaps I may boil the water; if I do boil the water I shall get steam; and you know that steam condenses when it gets cold, and you will therefore see, by that, whether I do boil the water or not. Perhaps, however, I shall not boil the water, but produce some other effect. You shall have the experiment and see. There is one wire which I will put to this side, A, and here is the other wire which I will put to the other side, B, and you will soon see whether any disturbance takes place. Here it is seeming to boil up famously; but does it boil? Let us see whether that which goes out is steam or not. I think you will soon see the jar, F, will be filled with vapor, if that which rises from the water is steam. But can it be steam? Why, certainly not; because there it remains, you see, unchanged. There it is, standing over the water, and it therefore cannot be steam, but must be a permanent gas of some sort. What is it? Is it hydrogen? is it steam? is it anything else? Well, we will examine it. If it is hydrogen it will burn. [The lecturer then ignited the gas collected, which burnt with an explosion.] It is certainly something combustible, but not combustible in the way that hydrogen is. Hydrogen would not have given you that noise, but the color of that light when the thing did burn, was like that of hydrogen; it will, however, burn without contact with the air. That is why I have chosen this other form of apparatus for the purpose of pointing out to you what are the particular circumstances of this experiment. In place of an open vessel, I have taken one that is closed (our battery is so beautifully strong, that we are even boiling the mercury, and getting all things right—not wrong, but vigorously right); and I am going to show you that that gas, whatever it may be, can burn without air, and in that respect differs from a candle, which cannot burn without the air. And our manner of doing that is as follows: I have here a glass vessel, G, which is fitted with two platinum wires, I K, through which I can apply electricity; and we can put the vessel on the air-pump and exhaust the air, and when we have taken out the air we can bring it here and fasten it on to this jar, F, and let that gas into the vessel which was formed by the action of the voltaic battery upon the water, and which we have produced by changing the water into it—for I may go so far as this, and say we have merely, by that experiment, changed the water into that gas. We have not only altered its condition, but we have changed it really and truly into that gaseous substance; and all water is there which was decomposed by the experiment. As I screw this vessel, G H', on here, and make the tubes well connected, and when I open the stop-cocks, H H H', if you watch the level of the water in F, you will see that that gas will rise. Now, I will close the stop-cocks, as I have drawn up as much as that vessel can hold, and being safely conveyed into that chamber, I will pass into it an electric spark from this Leyden jar, L, and the vessel, which is now quite clear and bright, will become dim. There will be no sound, for the vessel is strong enough to confine the explosion. [A spark was then passed through the jar, when the explosive mixture was ignited.] Did you see that brilliant light? If I again screw the vessel on to the jar, and open those stop-cocks, you will see that the gas will rise a second time. [The stop-cocks were then opened.] Those gases [referring to the gases first collected in the jar, and which had just been ignited by the electric spark] have disappeared, as you see; their place is vacant, and fresh gas has gone in. Water has been formed of them; and if we repeat our operation [repeating the last experiment], I shall have another vacancy, as you will see by that water rising. I always have an empty vessel after the explosion, because the vapor or gas into which the water has been resolved by the battery, explodes under the influence of the spark, and changes into water; and by and by you will see in this upper vessel some drops of water trickling down the sides and collecting at the bottom.

We are here dealing with water entirely, without reference to the atmosphere. The water of the candle had the atmosphere helping to produce it; but in this way it can be produced independently of the air. Water, therefore, ought to contain that other substance which the candle takes from the air, and which, combining with the hydrogen, produces water.

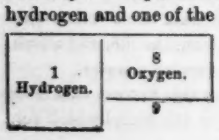
Now, you saw that one end of this battery took hold of the copper, extracting it from the vessel which con-



tained the blue solution. It was effected by this wire; and surely we may say if the battery has such power with a metallic solution which we made and unmade, may we not think that it is posible that it can split asunder the component parts of the water, and put them into this place and that place? Suppose I take the poles—the metallic ends of this battery—and see what will happen with the water in this apparatus, where we have separated the two ends far apart. I place one here (at A), and the other there (at B), and I have little shelves with holes which I can put upon each pole, and so arrange them that whatever escapes from the two ends of the battery will appear as separate gases; for you saw that the water did not become vaporous but gaseous. The wires are now in perfect and proper connection with the vessel containing the water, and you see the bubbles rising; let us collect these bubbles and see what they are. Here is a glass cylinder, O. I fill it with water and put it over one end, A, of the pile, and I will take another, H, and put it over the other end, B, of the pile. And so now we have a double apparatus, with both places delivering gas. Both these jars will fill with gas. There they go, that to the right (H) filling very rapidly; the one to the left (O) filling not so rapidly; and though I have allowed some bubbles to escape, yet still the action is going on pretty regularly, and were it not that one is rather smaller than the other, you would see that I should have twice as much in this (H) as I have in that (O.) Both these gases are colorless; they stand over the water without condensing; they are alike in all things—I mean in all *apparent* things; and we have here an opportudity of examining these bodies and seeing what they are. Their bulk is large, and we can easily apply experiments to them. I will take this jar (H) first, and will ask you to be prepared to recognize hydrogen.

Think of all its qualities—the light gas which stood well in inverted vessels, burning with a pale flame at the mouth of the jar, and see whether this gas does not satisfy all these conditions. If it be hydrogen, it will remain here while I hold this jar inverted. [A light was then applied, and the hydrogen burned.] What is there now in the other jar? You know that the two together made an explosive mixture. But what can this be which we find as the other constituent in water, and which must, therefore, be that substance which made the hydrogen burn? We know that the water we put into the vessel consisted of the two things together. We find one of these is hydrogen; what must that other be which was in the water before the experiment, and which we have now by itself? I am about to put this lighted splinter of wood into the gas. The gas itself will not burn, but it will make the splinter of wood burn. [The lecturer ignited the end of the wood and introduced it into the jar of gas.] See how it invigorates the combustion of the wood, and how it makes it burn far better than the air would make it burn, and now you see by itself that every other substance which is contained in the water, and which, when the water was formed by the burning of the candle, must have been taken from the atmosphere. What shall we call it, A, B, or C? Let us call it O—call it "Oxygen;" it is a very good, distinct-sounding name. This, then, is the oxygen which was present in the water, forming so large a part of it.

We shall now begin to understand more clearly our experiments and researches; because when we have examined these things once or twice we shall soon see why a candle burns in the air. When we have in this way analyzed the water—that is to say, separated or electrolyzed its parts out of it—we got two volumes of hydrogen and one of the body that burns it. And these



Oxygen,	88.9
Hydrogen,	11.1
Water,	100.0

two are represented to us on this diagram, with their weights also stated, and we shall find that oxygen is a very heavy body by comparison with the hydrogen. It is the other element in water.

I had better, perhaps, tell you now how we get this oxygen abundantly, having shown you how we can separate it from the water. Oxygen, as you will immediately imagine, exists in the atmosphere; for how should the candle burn to produce water without it? Such a thing would be absolutely impossible, and chemically impossible without oxygen. Can we get it from the air? Well, there are some very complicated and difficult processes by which we can get it from the air; but we have better processes. There is a substance called the black oxyd of manganese; it is a very black looking mineral, but very useful, and when made red hot it gives out oxygen. Here is an iron bottle which has had some of this substance put into it, and there is a tube fixed to it, and a fire ready made, and Mr. Anderson will put that retort into the fire, for it is made of iron and can stand the heat. Here is a salt called chlorate of potassa, which is now made in large quantities for bleaching, and chemical and medical uses, and for gunpowder and other purposes. I will take some and mix it with some of the oxyd of manganese (oxyd of copper or oxyd of iron would do as well), and if I put them in a retort, far less than a red heat is sufficient to evolve this oxygen from the mixture. I am not preparing to make much, because we only want sufficient for our experiments; only, as you will see immediately, if I use too small a charge, the first portion of the gas will be mixed with the air already in the retort, and I should be obliged to sacrifice the first portion of the gas because it would be so much diluted with air; the first portion must therefore be thrown away. You will find in this case that a common spirit lamp is quite sufficient for me to get the oxygen, and so we shall have two processes going on for its preparation. See how freely the gas is coming over from that small portion of the mixture. We will examine it and see what are its properties. Now, in this way, we are producing, as you will observe, a gas just like the one we had in the experiment with the battery, transparent, undissolved by water, and presenting the ordinary visible properties of the atmosphere. (As this first jar contains the air together with the first portions of the oxgen set free during the preparation, we will carry it out of the way, and be prepared to make our experiments in a regular, dignified manner.) And inasmuch as that power of making wood, wax, or other things burn, we so marked in the oxygen we obtained by means of the voltaic battery from water, we may expect to find the same property here. We will try it. You see there is the combustion of a lighted taper in air, and here is its combustion in this gas [lowering the taper into the jar]. See how brightly and how beautifully it burns—you can also see more than this—you will perceive it is a heavy gas, whilst the hydrogen would go up like a balloon, or even faster than a balloon, when not encumbered with the weight of the envelope. You may easily see that although we obtained from water twice as much in volume of the hydrogen as of oxygen, it does not follow that we have twice as much in weight; because one is heavy and the other a very light gas. We have means of weighing gases or air; but without stopping to explain that, let me just tell you what their respective weights are. The weight of a pint of hydrogen is three-quarters of a grain; the weight of the same quantity of oxygen is nearly twelve grains. This is a very great difference. The weight of a cubic foot of hydrogen is one-twelfth of an ounce; and the weight of a cubic foot of oxygen is one ounce and a third. And so on, we might come to masses of matter which may be weighed in the balance, and which we can take account of as to hundredweights and as to tuns, as you will see almost immediately.

Now, as regards this very property of oxygen supporting combustion, which we may compare to air, I will take a piece of candle to show it you in a rough way, and the result will be rough. There is our candle burning in the air; how will it burn in oxygen? I have here a jar of this gas, and I am about to put it over the candle for you to compare the action of this gas with that of the air. Why, look at it; it looks something like the light you saw at the poles of the voltaic battery. Think how vigorous that action must be! And yet during all that action nothing more is produced than what is produced by the burning of the candle in air. We have the same production of water; and the same phenomena exactly, when we use this gas instead of air, as we have when the candle is burnt in air.

But now we have got a knowledge of this new substance, we can look at it a little more distinctly, in order to satisfy ourselves that we have got a good general understanding of this part of the product of a candle. It is wonderful, you see, how great the supporting powers of this substance are as regards combustion. For instance, here is a lamp which, simple though it be, is the original, I may say, of a great variety of lamps which are constructed for divers purposes—for lighthouses, microscopic illuminations, and other uses; and if it was proposed to make it burn very brightly, you would say, "If a candle burnt better in oxygen, will not a lamp do the same?" Why, it will do so. Mr. Anderson will give me a tube coming from our oxygen reservoir, and I am about to apply it to this flame, which I will previously make burn badly on purpose. There comes the oxygen; what a combustion that makes! But if I shut it off, what becomes of the lamp? [The flow of oxygen was stopped, and the lamp relapsed to its former dimness.] It is wonderful how by means of oxygen, we get combustion accelerated. But it does not effect merely the combustion of hydrogen, or carbon, or the candle; but it exalts all combustion of the common kind. We will take one which relates to iron, for instance, as you have already seen iron burn a little in the atmosphere. Here is a jar of oxygen, and this is a piece of iron wire; but if it were a bar as thick as my wrist, it would burn the same. I first attach a little piece of wood to the iron, I then set the wood on fire, and let them both down together in the jar. The wood is now alight, and there it burns as wood should burn in oxygen; but it will soon communicate its combustion to the iron. The iron is now burning brilliantly, and will continue so for a long time. As long as we supply oxygen, so long can we carry on the combustion of the iron, until the latter is consumed.

We will now put that on one side, and take some other substance; but we must limit our experiments, for we have not time to spare for all the illustrations you would have a right to, if we had more time. We will take a piece of sulphur: you know how sulphur burns in the air; well, we will put it into the oxygen, and you will see that whatever can burn in the air can burn with a far greater intensity in oxygen, leading you to think that perhaps the atmosphere itself owes all its power of combustion to this gas. The sulphur is now burning very quietly in the oxygen; but you cannot for a moment mistake the very high and increased action which takes place when it is so burned, instead of being burned merely in common air.

I am now about to show you the combustion of another substance—phosphorus. I can do it better for you here than you can do it at home. This is a very combustible substance, and if it be so combustible in air, what might you expect it would be in oxygen? I am about to show it to you not in its fullest intensity, for if I did so, we should almost blow the apparatus up; I may even now crack the jar, though I do not want to break things carelessly. You see how it burns in the air. But what a glorious light it gives out when I introduce it into oxygen! [Introducing the lighted phosphorus into the jar of oxygen.] There you see the old solid particles going off which cause that combustion to be so brilliantly luminous.

Thus far we have tested this power of oxygen and the high combustion it produces, by means of other substances. We must now, for a little while longer, look at it as respects the hydrogen. You know that when we allowed the oxygen and the hydrogen derived from the water to mix and burn together, we had a little explosion. You remember also that when I burnt the oxygen and the hydrogen in a jet together, we got very little light but great heat; I am now about to set fire to oxygen and hydrogen mixed in the proportion in which they occur in water. Here is a vessel containing one volume of oxygen and two volumes of hydrogen. This mixture is exactly of the

same nature as the gas we just now obtained from the voltaic battery; it would be far too much to burn at once; I have therefore arranged to blow soap bubbles with it and burn those bubbles, that we may see by a general experiment or two how this oxygen supports the combustion of hydrogen. Frst of all we will see whether we can blow a bubble. Well, there goes the gas [causing it to issue through a tobacco pipe stem into some soap suds.] Here I have a bubble. I am receiving them on my hand, and you will perhaps think I am acting oddly in this experiment, but it is to show you that we must not always trust to noise and sounds, but rather to real facts. [Exploding a bubble on the palm of his hand.] I am afraid to fire a bubble from the end of the pipe, because the explosion would pass up into the jar and blow it to pieces. This oxygen will then unite with the hydrogen, as you see by the phenomena and hear by the sound, with the utmost readiness of action, and all its powers are then taken up in its neutralization of the qualities of the hydrogen.

So now I think you will perceive the whole history of water with reference to oxygen and the air, from what we have before said. Why does a piece of potassium decompose water? Because it finds oxygen in the water. What is set free when I put in the water, as I am about to do again? It sets free hydrogen and the hydrogen burns; but the potassium itself combines with oxygen; and this piece of potassium, in taking the water apart—the water, you may say, derived from the combustion of the candle—takes away the oxygen which the candle took from the air, and so sets the hydrogen free; and even if I take a piece of ice, and put a piece of potassium upon it, the beautiful affinities by which the oxygen and hydrogen are related are such that the ice will absolutely set fire to the potassium. I show this to you to-day, in order to enlarge your ideas of these things, and that you may see how greatly results are modified by circumstances. There is the potassium on the ice, producing a sort of volcanic action.

It will be my place, when next we meet, having pointed out these anomalous actions, to show you that none of these extra and strange effects are met with by us—that none of these strange and injurious actions take place when we are burning, not merely a candle, but gas in our streets, or fuel in our fireplaces, so long as we confine ourselves within the laws that Nature has made for our guidance.

WATER-WORKS OF AMERICA.

BOSTON, MASS.

OFFICE OF THE COCHITUATE WATER BOARD,
Boston, January 15th, 1861.

TO THE CITY COUNCIL:

The Cochituate Water Board respectfully submit to the City Council their Annual Report for the year 1860. In compliance, also, with the City Ordinances, they submit the Reports of the City Engineer, the Water Registrar, and the Clerk of this Board, all of which are worthy of attention from those who are interested to know the condition and workings of this department.

It is believed that the works were never in a condition more safe and efficient than at the present time.

* * * * * *

CONSUMPTION OF WATER.

In the last Annual Report, the following language was used: "It seems as if we might now fairly conclude that the individual consumption had come to its maximum,—the variation in three years not exceeding one gallon;" say 72½ to 73 gallons. But the present year is a fearful example of the fallacy of such calculating. By the Report of the Engineer, hereto annexed, it appears that the average daily consumption of water has been 17,238,000 gallons. By the census returns, it appears that the number of inhabitants is 177,902. *This shows a consumption of 97 gallons for each individual—an amount believed to be without parallel in the civilized world.* Of course there is nothing in the sales of the water that could lead to the expectation of such a monstrous increase; *and we must again resort to the old story of extravagant and inordinate waste.*

The past year has afforded the first opportunity ever enjoyed to test the capacity of the lake. During the year, not a pint has been allowed to escape that could be retained. It has been impossible to fill the lake to the height of the dam, so the whole has been drawn to the city. The fall of rain has been unusually large; say 55½ inches; while the average of nine years has been 48¾. The actual daily delivering of water has been 17,238,000 gallons, and the water in the lake, January 1, this year, being ten inches higher than a year ago, would give an additional supply of about one-half a million gallons daily, or about 17,700,000 gallons. It would seem to be a safe inference that, in years when we have 55½ inches of rain, the maximum yield of the lake will be 17,700,000 gallons, and no more. But as in the average of years only 48¾ inches fall, we can safely rely upon only a proportional diminished supply.

In bringing this enormous quantity of water to the city, the Board can but express the opinion that the capacity of the aqueduct has been put to the severest test that ought ever to be applied to it. To work it under any increased head must be attended with the utmost hazard.

Two conclusions seem to this Board now to be reached of a practical character. The *first* is, that the lake can be relied on for no greater supply of water than has been drawn from it this year; and the *second* is, that the aqueduct can convey no more water than it has done this year.

These conclusions are of a nature to arrest public attention, and to induce inquiry what is to be done. What use shall we make of the present quantity, in view of the great difficulty and expense of increase? Every effort should be made to guard against *waste.* The people can economize in its use, for they have done so. When the break took place at Needham, the consumption was reduced near three-fourths.

This Board was in hopes that some latitude might be indulged in in playing the public fountains, and in supplying opportunity for skating. But nothing of these indulgences can be entertained. Any considerable quantity drawn for skating, must put in jeopardy the supply on Beacon Hill and all the high service. If at all, and under any circumstances, this object is to be thought of, it should be done with the greatest care not to interfere with the regular and necessary supply.

When all the unnecessary uses of the water are stopped, then, in case of insufficient quantity, it would become the policy of the city to cut off, one after another, the classes of takers for mechanical purposes. It is to be hoped, however, that the time is not near at hand when this will be necessary; it is only alluded to as indicating what would undoubtedly become the policy of the city, at all times in order to supply a full and needful quantity of pure water for domestic use.

This state of facts would seem to settle all idea of annexing other municipalities to the city of Boston.

Meters of WORTHINGTON'S construction continue to give entire satisfaction, and will be more extensively used.

Details of hydrants, stop-cocks, and extension of the work will be found in the Report of the City Engineer, annexed.

By reference to the Report of the Clerk of this Board, it will be seen that the expenditure for the year has been $146,304 55. Of this amount, $34,880 71 was for the new main, $17,398 26 for raising pipes on Tremont and Dover streets, $4,491 27 for extending the 12-inch pipe on Beacon Street; and for extension of the work $59,120 98—leaving $30,413 33 as the expenses of the year.

All of which is respectfully submitted.

EBENEZER JOHNSON, *President.*
SAMUEL HALL,
GEORGE P. FRENCH,
CLEMENT WILLIS,
G. E. PIERCE,
GEORGE DENNIE,
L. MILES STANDISH.

ABSTRACT OF THE REPORT OF JAMES SLADE, ESQ., CITY ENGINEER.

OFFICE OF CITY ENGINEER,
Boston, January, 1861.

EBENEZER JOHNSON, ESQ.,
Pres. of the Cochituate Water Board:

Sir,—The usual Annual Report of matters connected with the Water Works is herewith submitted.

* * * * * *

RAISING THE DAM AT LAKE COCHITUATE.

During the past year Mr. Knowlton has kept a record, as hitherto, of the daily heights of water at the lake. By condensing and summing up these heights, we find that during 4 days the water stood at a level of only *five* feet in the lake. 29 days it stood *above five* and *less than six* feet. 64 days stood *above six* and *less than seven* feet. 173 days *above seven* and *less than eight* feet. 42 days *above eight* and *less than nine* feet. 54 days *over nine* feet, and 7 days it has been *up* to *nine feet seven inches* in the lake.

Until the latter part of 1859, when the dam and roads about the lake had been raised two feet, the extreme depth of water which could be made available from the lake by gravitation, was only eight feet. Two feet being then added, would give us an available depth of ten feet when the lake is full, provided we used no more water than originally expected. But as our increase of consumption has been largely over what was expected when the works were constructed, we must deduct the difference in depth required to keep up such a supply as we now require, which leaves but about six and a half feet of really available depth when the lake is full. During the past year we have been benefited by the raising for the full period of 103 days. To this we may add a few days when the water was so nearly up to eight feet that we should have been compelled to waste the water from the lake to avoid the danger of its breaking over the dams, had there been a sudden freshet. We have therefore been benefited nearly one-third of the year, because the dam, roads, and gate-house were raised. The extra amount of water which we have been enabled to save on this account equals about 1,500,000,000 gallons, which would have supplied the city 88 days at the rate of 17,000,000 gallons per day. It is also equal to a depth of about seven feet over the entire surface of the lake.

WASTE WATER, CONSUMPTION OF WATER, AND CAPACITY OF THE LAKE.

In my report for the year 1859, it was shown that during the early part of that year, and up to July the 8th, a large amount of water was wasted from the lake into Sudbury River.

From July 8th, 1859, to January 1st, 1861, there has not been any water wasted in that direction. All the water drawn from the lake has been brought to the city.

By reference to the table of *consumption* of *water* it will be seen that the amount used during the past year, has averaged over 17,000,000 gallons daily, an average increase of more than 4,000,000 daily, over the amount used in 1859, and about twice as much as was brought to the city in 1853.

Much of this additional increase of consumption is owing, no doubt, to the increased effective head on the pipes caused by the new 40-inch main. This new main was connected with the 30-inch main crossing the Common in the latter part of December, 1859. The consumption of water in that month was a little rising of 14,500,000 gallons daily. In January following, the amount used averaged nearly 18,000,000 gallons daily, and in February nearly 19,000,000 gallons were used daily, it being in January over 3,000,000 gallons, and in February over 4,000,000 gallons more than had ever been used in any previous month since the introduction of the Cochituate water.

On the first of January, 1860, the water stood at the height of 7 feet 6 inches in the Lake. On the first of January, 1861, the water stood at the height of 8 feet 4 inches in the Lake, a depth of 10 inches gain, equal to 187,000,000 gallons over and above the total consumption in the year, equal to a daily average of about 500,000 gallons. Adding this to the daily average amount used, we have a trifle over 17,700,000 gallons as a total daily amount afforded by the lake during the past year.

The average annual rain-fall at the lake during the past nine years has been 48 77-100 inches. For the year 1860 the total rain-fall was 55 44-100 inches at the lake; for 1853 the total rain-fall was 55 86-100 inches—the rain-fall in 1853 and in 1860 being very nearly the same, and the amounts of water afforded by the lake in these two years being also very nearly the same.

The commissioners of 1845, after a very careful se-

ries of observations, estimated that the daily average which the lake would afford, was equal to 10,176,570 gallons per day, and this was the basis on which the works were built and the money expended for them.

By reference to the report for 1856, pages 5 to 9 inclusive, of the appendix (the City Engineer's Report), the amount of water used and wasted from the lake will be seen. The conclusion then arrived at was, that the lake could be relied on to furnish an average daily supply of over 16,000,000 gallons of water by storing its waters one year with another.

In the year 1853, the lake afforded a daily average of 17,217,417 gallons: one-half of this amount only having been brought to the city.

In 1855 we used 10,346,300 gallons daily, and wasted an unknown amount directly from the lake, having no use for it. In 1860, as previously shown, the daily use and reserve amounted to a little over 17,700,000 gallons.

The original expectation was that 250,000 inhabitants would use 7,250,000 gallons daily. At this time 180,000 inhabitants actually use 17,238,000 gallons daily. At the last rate of consumption 250,000 inhabitants will use 24,000,000 gallons of water daily—an increase of about 230 per cent. over what was supposed sufficient when the works were built.

There will be occasional years when we shall have a still larger amount of water afforded by the lake, and very probably there will also be years when the amount will fall short of the past year's supply.

I do not consider it safe to rely on any more increase of supply to be obtained from the lake, unless other large storing reservoirs are made in which to store the water in unusual wet seasons, or any other additional source is added to it.

CONDUIT.

During the past year, although the water has been kept running through the conduit in unprecedented quantities, there has been no break in it, neither has it required any unusual repairs. The banks over it have been strengthened in a few places. It is now as strong as ever, but it will be extremely dangerous to undertake to run more water through it than we now do.

The following table shows the different heights at which the water has been running, and the number of days in each month at the different heights.

The height of the conduit is six feet four inches.

	HEIGHTS IN FEET AND INCHES.									
			These heights show a head on the Conduit.							
	0.0	6.4	7.0	7.4	7.6	7.7	7.8	7.10	8.0	9.0
	NUMBER OF DAYS IN EACH MONTH.									
January	....	....	31	....	....	....	....	....	....	....
February	....	....	29	....	....	....	....	....	....	....
March	....	27	4	....	....	....	....	....	....	....
April	....	30	....	....	....	....	....	....	....	....
May	1	17	13	....	....	....	....	....	....	....
June	....	....	15	....	15	....	....	....	....	....
July	2	....	....	....	2	....	21	....	6	....
August	1	....	....	....	9	....	19	....	1	1
September	....	....	18	7	5	....	....	....	....	....
October	....	....	31	....	....	....	....	....	....	....
November	....	....	30	....	....	....	....	....	....	....
December	....	....	11	....	14	1	2	3	....	....
	4	74	182	7	45	1	42	3	7	1

CONSUMPTION OF WATER.

It will be seen by this table that the conduit has been empty only four days during the year. It has been just full 74 days, and for 287 days, being the remainder of the year, with one day's exception, it has been running with a head on it varying from eight inches to one foot eight inches.

In 1859 the conduit was empty 12 days. It was run less than full 93 days; just full 145 days; 17 days with a head on it of four inches, and only 98 days with a head on it varying from eight inches to one foot eight inches; running in 1860, 190 days more than in 1859, with the large head upon it.

CONSUMPTION OF WATER. DAILY AVERAGE NUMBER OF WINE GALLONS DRAWN FROM THE BROOKLINE RESERVOIR.

MONTHS.	1853	1854	1855	1856	1857	1858	1859	1860
January	8,050,500	10,695,200	9,702,700	12,669,000	15,089,000	12,160,000	14,512,000	17,862,000
February	8,643,600	10,654,200	10,349,800	12,791,000	14,175,000	14,399,000	14,769,000	18,901,000
March	8,202,200	9,582,100	10,125,600	12,504,000	13,941,000	14,154,000	14,480,000	15,409,000
April	7,903,600	8,738,500	8,540,000	10,800,000	12,454,000	13,465,000	13,760,000	14,621,000
May	8,123,400	9,685,300	9,103,800	10,378,000	12,414,000	11,423,000	11,302,000	14,790,000
June	8,945,900	11,745,200	9,984,400	11,223,000	12,504,000	10,867,000	11,639,000	17,838,000
July	8,809,200	10,613,800	11,056,600	13,167,000	13,551,000	13,621,000	13,219,000	17,239,000
August	8,461,900	10,028,100	11,120,800	12,664,000	13,077,000	13,141,000	12,704,000	19,297,000
September	8,640,700	9,712,400	11,710,800	11,522,000	12,030,000	12,745,000	12,389,000	17,957,000
October	8,871,100	8,769,800	10,771,200	11,891,000	10,864,000	12,969,000	12,026,000	16,938,000
November	8,624,700	8,030,200	10,383,200	11,691,000	11,372,000	12,143,000	12,715,000	16,862,000
December	9,228,400	10,597,600	11,307,200	13,284,000	11,241,000	13,075,000	14,586,000	19,151,000
Av'rage for year	8,542,300	9,902,000	10,346,300	12,048,600	12,726,000	12,847,000	13,175,000	17,238,000

AVERAGE MONTHLY HEIGHTS OF WATER IN THE RESERVOIRS AT BROOKLINE, BEACON HILL, SOUTH BOSTON, AND EAST BOSTON, 1856–1860 INCLUSIVE.

MONTH.	BROOKLINE.					BEACON HILL.					SOUTH BOSTON.					EAST BOSTON.				
	1856	1857	1858	1859	1860	1856	1857	1858	1859	1860	1856	1857	1858	1859	1860	1856	1857	1858	1859	1860
January	120.44	123.76	124.55	124.48	123.27	115.87	112.09	116.33	114.02	118.25	109.83	110.28	113.17	114.11	107.48	89.45	94.57	95.77	93.51	93.26
February	123.71	123.93	124.56	124.68	122.95	116.86	114.28	113.81	115.36	117.94	109.80	110.39	113.28	114.33	109.30	87.17	93.62	93.80	93.47	95.29
March	123.50	123.94	124.37	124.48	123.88	116.87	114.10	114.27	116.61	119.89	109.86	110.53	113.28	114.60	109.40	90.05	94.03	93.75	93.88	94.80
April	124.18	124.15	124.66	122.52	123.77	118.48	115.51	117.10	116.99	119.83	109.58	110.76	113.05	114.69	109.84	95.33	96.00	95.99	93.97	93.84
May	124.27	124.11	124.49	124.48	123.13	118.03	114.22	117.70	117.01	117.70	107.64	111.24	112.67	114.35	111.90	99.36	93.48	94.85	94.79	66.66
June	124.25	124.37	124.54	124.22	123.26	113.42	114.47	116.40	115.65	116.69	109.30	111.05	86.70	113.88	113.17	101.05	95.37	93.60	93.98	96.29
July	123.72	124.36	125.65	124.05	122.99	114.92	114.18	115.36	115.30	116.13	109.73	110.45	114.12	113.62	113.26	91.31	93.53	92.91	93.48	95.53
August	124.02	123.93	124.56	124.13	122.78	116.84	114.00	114.81	114.82	115.70	110.65	110.35	113.85	112.88	110.97	94.15	93.99	96.88	93.41	96.99
September	124.12	123.46	124.60	124.37	123.33	115.93	114.72	116.45	113.82	117.15	108.70	110.19	110.90	111.88	114.66	94.68	92.23	93.45	93.61	95.97
October	123.97	124.40	124.41	124.29	123.59	116.41	116.21	116.59	114.76	115.34	107.68	107.58	111.46	111.88	113.49	95.18	91.47	94.05	93.97	96.97
November	123.98	124.29	124.62	123.55	123.62	115.77	115.98	116.73	114.90	116.23	107.55	111.37	114.22	110.85	114.48	96.94	94.79	94.84	93.79	97.60
December	123.79	124.66	124.60	123.60	122.98	114.40	117.45	116.44	113.61	114.67	109.84	112.98	114.16	109.75	114.91	94.65	97.04	93.70	91.77	98.89
Average	123.66	124.11	124.63	124.07	123.29	116.15	114.77	116.00	115.24	117.18	109.18	110.60	110.91	112.98	111.86	94.11	94.18	94.42	94.05	96.01

NOTE.—The above average heights are given in feet and parts, above marsh level. Maximum high water in the Brookline Reservoir is 124.6 feet above marsh level. By deducting the heights in the City Reservoirs from the heights in the Brookline Reservoir, in each month, we find the LOSS OF HEAD in the different sections of the city at that time.

Loss of head from the Brookline Reservoir to Beacon Hill and East Boston Reservoirs.

The effect of increased consumption of water in the city may be seen by reference to the table in this and previous reports of *average annual heights of water in the reservoirs.*

A synopsis is given in the following table:

YEAR.	Average annual heights of Water above Marsh Level in—			Loss of Head from Brookline to Beacon Hill Reservoir.	Loss of Head from Brookline to East Boston Reservoir.
	Brookline Reservoir	Beac'n Hill Reservoir	E. Boston Reservoir		
1850	123.16	119.04	.....	4.12	....
1851	123.86	119.89	105.06	3.97	18.30
1852	123.67	116.60	104.07	7.07	19.60
1853	122.86	114.89	104.91	7.97	17.95
1854	123.65	115.69	99.84	7.96	23.81
1855	123.82	117.79	97.49	6.03	26.33
1856	123.66	116.15	94.11	7.51	29.55
1857	124.11	114.77	94.18	9.34	29.93
1858	124.63	116.00	94.42	8.63	30.21
1859	124.07	115.24	94.05	8.83	30.02
1860	123.29	117.18	96.01	6.16	27.28

Extreme high water in Brookline Reservoir is 124.6 feet.

Monthly Fall of Rain, in inches, in 1860.

MONTH.	PLACES AND OBSERVERS.					
	Lake Cochituate, by E. F. Knowlton.	Boston, by J. P. Hall.	Lowell, by Merrimack Mnf'g Co. J. B. Francis.	Lowell, by Locks and Canals Co. J. B. Francis.	Cambridge, by G. P. Bond.	Providence, by A. Caswell.
January	1.24	1.89	0.66	0.80	1.00	0.80
February	3.80	3.85	2.06	2.44	2.21	3.54
March	1.98	2.19	2.08	2.14	1.78	1.80
April	2.25	1.78	1.02	1.09	1.32	1.55
May	1.98	2.35	1.91	1.85	2.26	1.65
June	11.16	8.01	4.87	4.84	7.37	4.02
July	6.82	5.90	6.87	6.55	5.65	3.09
August	4.89	4.80	5.03	4.30	5.24	5.70
September	9.92	7.35	9.44	9.96	9.33	5.38
October	1.72	2.66	2.46	2.50	1.86	2.10
November	5.97	5.87	4.65	3.71	4.23	3.95
December	3.71	5.86	5.86	6.49	4.75	4.66
Totals	55.44	51.46	46.91	46.67	46.95	38.24

NOTE.—The melted snow is, as usual, included in the above amounts of rainfall.

Recapitulation of Mains laid in 1860.

SECTION.	1860.	Diameter in inches.				
		40	36	12	6	4
Boston Proper	Total number of feet laid	670	636	2,437	4,091	1,064
	Stop-cocks in the same	1	1	8	7	4
South Boston	Total number of feet laid	....	....	4,082	9,340	1,112
	Stop-cocks in the same	....	....	3	18	4
East Boston	Total number of feet laid	....	....	....	1,070	156
	Stop-cocks in the same	....	....	....	2	.....
	Sums of Pipes	670	636	6,519	14501	2,332
	Sums of stop cocks	1	1	11	27	8

During the year one hundred and ten feet of 6-inch pipe and one hundred and fifty feet of 4-inch pipe have been taken up in the city proper.

2,827 feet of 6-inch and 101 feet of 4-inch in South Boston.

LEAKS.

Of leaks that have occurred in pipes of four inches in diameter and upwards, one hundred and four were caused by the loosening of lead in the joints, ten by settling of earth, four by frost, nine by defective stop-cocks, six by defective pipes, and one struck by a

pick. Total, one hundred and thirty-four in pipes of four inches and upwards.

Of the leaks that have occurred in service pipes and two-inch pipes, sixty-five were caused by fish, forty by defective pipes, twenty-five by frost, fourteen by defective cocks, thirty-one by stiff connections, eighteen by rust, one hundred and twenty-seven by the settling of earth, seventeen struck by picks, two destroyed by the soil, thirty-nine by defective couplings, thirty by builders and drain diggers, one stopped by paper, nine by cocks blowing out, three by rats, four by boxing cellars, one stopped by gasket, three by tenants, two by driving piles, three stopped by dirt, and twenty-four by defective joints.

Total, four hundred and fifty-eight in service and two-inch pipes.

Statement of the Number of Leaks, 1850–1860.

YEAR.	LEAKS IN PIPES OF A DIAMETER OF		
	Four inches and upwards.	Less than four inches.	Total.
1850	32	72	104
1851	64	173	237
1852	82	241	323
1853	85	260	345
1854	74	280	354
1855	75	219	294
1856	75	232	307
1857	85	278	363
1858	77	324	401
1859	82	449	531
1860	134	458	592

WATER REGISTRAR'S REPORT.

OFFICE OF WATER REGISTRAR, CITY HALL,
Boston, January 1, 1861.

E. JOHNSON, ESQ.,

Pres. of the Cochitutate, Water Board:

SIR,—I herewith submit the following Report, prepared according to the 16th section of the ordinance, passed Oct. 31, 1850.

The total number of water-takers, now entered for the year 1861, is 24,316—being an increase, since January 1, 1860, of 1,045.

During the year there has been 1,085 cases where the water has been shut of; of these, 1,067 were for non-payment of water rates, and 18 were for unnecessary waste of water.

The number of cases where the water has been turned on is 1,661; of these, 759 were cases which had been shut off for non-payment of rates; 11 were shut off for unnecessary waste, and 891 were turned on for the first time.

The total amount received from December 31, 1859, to January 1, 1861, is		334,544 86
Of the above there was received for water used in previous years the sum of	1,041 91	
Leaving the receipts for water used during the year 1860, the sum of	333,502 95	
In addition to the above, there has been received for letting on the water, in cases where it had been turned off for non-payment of rates, the sum of		1,517 50
Total amount		$336,062 36
The increased amount of receipts in 1860, over the previous year, is		19,771 39
The amount of assessments now made for the present year is		278,389 20
The estimated amount of income from the sales of water during the year 1861 is		350,000 00
The expenditures of my Department during the year 1860 have been		3,429 75

The items of this expenditure are as follows:

Paid Chas. L. Bancroft, for services as clerk	$867 50
" Stephen Badlam for services as "	867 50
" Chas. E. Dunham, for services as inspector	743 50
" Noah P. Burgess, for services as inspector	678 50
" Rand & Avery, for printing	110 50
" Eayres & Fairbanks, for stationery	94 25
" M. Lyon, for distributing water bills	24 00
" J. R. Barry, " "	22 00
" Geo. S. Carpenter " "	22 00
Amount	$3,429 75

ANNUAL REVENUE FROM WATER.

The following table exhibits the yearly revenue received from the sales of Cochituate water, since its introduction into the city, Oct. 25, 1848:

From Oct. 25, 1848, to Jan. 1, 1850	-	72,043 20
Jan. 1, 1850, to " " 1851	-	98,367 90
" " 1851, to " " 1852	-	161,299 72
" " 1852, to " " 1853	-	179,486 25
" " 1853, to " " 1854	-	196,352 32
" " 1854, to " " 1855	-	217,007 51
" " 1855, to " " 1856	-	266,302 77
" " 1856, to " " 1857	-	282,651 84
" " 1857, to " " 1858	-	289,328 83
" " 1858, to " " 1859	-	302,409 73
" " 1859, to " " 1860	-	314,808 97
" " 1860, to " " 1861	-	334,544 86
		$2,714,603 90

Statement showing the average daily consumption of Cochituate water in the leading hotels, together with the amount of water-rate charged to each respectively.

	Galls. pr day	Dollars.
Tremont House, from Oct. 1, 1859, to Jan. 1, 1861.	25,230	1,740 93
Revere House, " " " "	24,410	1,723 54
Parker House, " " " "	20,515	1,459 79
American House, from Jan. 1, 1860, " "	16,448	981 92
United States Hotel " " " "	11,725	979 74
Winthrop House, from Oct. 1, 1859, " "	7,537	862 28
Marlboro' House, from Jan. 1, 1860, " "	8,261	711 30
Coolidge House, " " " "	4,462	606 66
Pearl St. House, " " " "	3,131	454 49
Totals		9,525 60

This amount of $9,526 60 for the use of Cochituate water in the above-named hotels, remains uncollected, owing to an injunction having been procured by the proprietors of these establishments to prevent the water being shut off from their premises. Sept. 15, 1860, the case was argued in the Supreme Court, but as yet no decision has been made known.

Statement showing the number and kind of water fixtures contained within the premises of water-takers in the city in 1858, 1859 *and* 1860.

1858	1859	1860	
4,326	4,475	4,714	Taps. These have no connection with any drain or sewer.
26,631	29,190	31,098	Sinks.
7,729	9,358	10,141	Wash-hand basins.
3,334	3,498	3,910	Bathing-tubs.
3,327	3,699	4,210	Pan water-closets.
3,845	4,476	5,071	Hopper water-closets.
173	409	583	Self-acting water-closets.
654	910	1,070	Urinals.
2,015	2,450	3,006	Wash-tubs. These are permanently attached to the buildings.
12	21	13	Shower-baths in houses where there is no tub.
9	10	10	Rams.
612	612	594	Private hydrants.
77	110	106	Slop hoppers.
52,744	59,218	64,526	

LIGHT WITHOUT HEAT.—Great heat without much light is produced by the combustion of hydrogen gas; and this fact has been successfully applied in the arts to the reduction of metals. Still we think that if the case were reversed, and great light produced without much heat, a boundless field would be presented for its application to the most useful purposes. In deep mines, for example, when the danger arising from explosions by common lamps is most imminent, this cold light would at once revolutionize the whole art of mining. Such a light could be employed in powder magazines, the holds of ships, and also in warehouses and manufactories containing combustible materials. Light and heat are different in their nature, and science seems to have settled that under certain circumstances they may be separated; but, for practical purposes, artificial light without heat has not yet been applied. The fire-fly emits a soft and beautiful light without its being apparently accompanied with equivalent heat. May not some mode be yet discovered for obtaining independent light without heat, and rendering it applicable to the purposes we have pointed out?—*Chemical News.*

GREENSBORO, N. C.—One of Aubin's gas-works, of Albany, N. Y., for rosin. Our report is an old one, before the works were fairly in operation.

ANSWERS TO CORRESPONDENTS.

G. P. B., of Conn.—*Hydro-carbon or water-gas, is not by any means a new thing. A patent was taken out in England as early as 1830 by one Donovan, who decomposed steam by passing it over red hot coke or charcoal, and mingled the resulting gases with the vapor of oil of turpentine or naphtha. Patents have since then been obtained by a number of individuals for making gas by a similar process, but no practical results of any moment have ensued.*

G. T. I., of Pa.—*It is a question of engineering rather than one of chemistry. It is one of those practical points which unfortunately are overlooked in most books on the subject. Your conclusion is right, and you ought to feel consoled for you trouble in arriving at it, from the fact of owing your success entirely to your own efforts.*

C. H., of Pa.—*With some exceptions, cannel coals contain more sulphur than is found in bituminous coal.*

A. G. R., of Va.—*You should use a gas thermometer which would afford you a ready means of detecting the inequality you speak of. The cost is trifling, and you will soon appreciate the beneficial effects of always knowing the exact temperature of the gas as it leaves the condensers.*

O. E. L., of N. C.—*Döbereiner's lamp is a very useful article to have at hand. You can procure them at any of our chemical apparatus stores at a cost varying from* $1 50 *to* $5 00.

A. R. E., of Ala.—*It would be vain to hazard an opinion on the question you propound, without thoroughly investigating the matter. It is a question upon which mere theorists are divided, and probably will remain so until the facts are adduced.*

GAS-LIGHT IN MINES IN ENGLAND.—In several portions of England, gas is used for the purpose of lighting mines. It is much more economical and satisfactory in every way than any other illuminating agent. It is generally passed through iron pipes, attached to the ceilings of the galleries, and consumed in ordinary burners, without glass chimneys. Among other places, gas is largely used in the mining districts of Lancashire and Northumberland.

At the Pendleburg colliery, near Manchester, gas from the city works is burned. A small gas-holder placed on the surface is connected with the distributing mains, and is so weighted that the gas is caused to descend to the bottom of the mine, where it is conducted to thirty-two burners. This gas-holder is filled every twenty-four hours.

At the Seghill colliery, in Northumberland, gas is made at the surface, purified only of its condensible products, and received into the gas-holder. Instead of being forced into the mine by pressure, it is made to descend by means of a falling column of water.

At Seaton the gas is produced in the interior of the mine, in an oven of five retorts, situated in a large opening near the outlet. The coal from which the gas is distilled comes directly from the mine, and the coke which results, is burned under the retorts.

In some places even fire-damp has been made to serve a useful purpose, by being employed as an illuminating agent. In Northumberland it has been collected from crevices, whence it issues, by means of funnels, and conducted through pipes to burners.

Fire-damp is also collected and burned for the purpose of illumination, at the colliery of Deep-Duffryn, in the south of Wales; thus this highly explosive compound, which has heretofore been dreaded by the miner, is now, by the application of modern science, not only rendered harmless, but capable of performing a useful service.

GAS IN ENGLAND.—The works of the Coleshill Gas Company are nearly completed. The town has been lighted for two months.

A public meeting of gas consumers at Elgin has been recently held to discuss grievances respecting their gas-light. The gas, according to the *Courant*, is bad in quality, and of a high price—16s. per 1000 feet. The Directors have expressed themselves willing to comply with the wishes of the community as far as practicable. The Directors have called a meeting of the shareholders to consider the matter.

The works for the lighting of Jarrow with gas have just been completed. They were planned by Mr. J. H. Little of Newcastle.

FULTON, N. Y.—Rosin Gas-Works built by N. B. Rice, and are satisfactory. Iron retorts used, with Samuel Down's meter; Rice's gas-holder. Pittston coal, costs $3.86 per 2,000 lbs.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

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WEDNESDAY, MAY 1, 1861.

THE process of carbonization is one presenting many interesting points of observation, which have an important bearing upon the economical manufacture of gas. The proper management of temperatures, the quality of coals used, the length of time at which charges are worked off, all present important phases in modifying the decomposition which takes place in the retorts; and upon the careful and intelligent superintendence of this process, depends the value of the gas produced.

It is well known that the decomposition of coal takes place, under certain circumstances, with great regularity; and, because of this uniformity of action, the time in which a charge can be worked off is predicted with almost absolute certainty; and thus, all the subsequent operations of the gas-works follow with great precision. Until practical experiment proved otherwise, it was generally believed that coal was decomposed gradually and regularly, the same proportions being made to yield their gaseous product towards the last of the operation as at first. The experience of those who investigated the laws of carbonization, however, proved this theory to be incorrect. Coal begins to be decomposed at a little below a red heat, equivalent to 1300° F. The process of decomposition continues for several hours, and the quantities of gas generated are much larger in the beginning of the operation than towards the end, gradually decreasing, until the cost of the minute quantity generated towards the termination of the decomposition, is far greater than that given off in the first few hours. Among writers on the manufacture of gas, PECKSTON has paid more attention to the theory and practice of carbonization, than any subsequent author. The time mentioned by him as required for the decomposition of coal, is as follows: In the first hour twenty per cent. of gas is given off, in the second fifteen, in the third fourteen, in the fourth nearly thirteen, in the fifth twelve, in the sixth ten, in the seventh nine, and in the eighth about eight. This result is attained only when the temperature is maintained uniformly, and the retorts are sustained at a full red heat. According to this calculation, the cubic foot produced at the end, is made at an expense of two and a half times as much as that generated at the commencement of the operation.

The established theory respecting the decomposition of coal, is, that at first tar is produced, which is subsequently decomposed into gas. The operation of the retorts, however simple it may seem to some, is doubtless very complex, and, although many of its changes have been studied and demonstrated, much remains to be understood. The products of distillation are many, and are each possessed of distinct characteristics. Even leaving the impurities which are generated along with the gas out of the question, the luminous hydro-carbons consist of many diverse bodies, similar in some respects, but different in certain chemical principles.

Carbonization should be closely studied, because of its prime importance in the operations of the gas-works, and as the mismanagement of the process is certain to produce a very inferior gas. Indeed the shareholders of gas companies no less than consumers are very much interested in this, as a careless superintendence of the retort-house is more apt to make an impression on the profit and loss account, to the detriment of the shareholder, than almost any other cause. One of the objections which has been urged by some engineers against clay retorts, has doubtless been on account of an injudicious regulation of temperatures, from ignorance of their practical action, which is equivalent to imperfect carbonization. A full cherry red heat, visible by day-light, is, by most engineers, deemed to be the proper temperature for effecting the most economical carbonization, and any great departure from this limit is productive of irregularities and imperfect results. Olefiant gas, which is the most valuable of all the luminous hydro-carbons, is decomposed above this degree of heat, and lower than a full cherry-red, more tar and less gas is given off. It being the object of the superintendents to extract the largest amount of valuable luminous gases from the coal, it will be seen how strictly the operation of this process should be attended to.

Another error made by some engineers, one from which the consumer suffers more than any other person, is, that at times not only is the heat under the retorts urged to too high a degree, but the charges are allowed to remain too long, and thus a very poor gas, with slight illuminating power, and low specific gravity, is produced. Towards the end of the operation of carbonization much hydrogen is eliminated, and the proportion of hydro-carbon vapor which accompanies it is very minute. It is evident that if the charges in the retorts are subjected to distillation for too long a period, this large quantity of nearly pure hydrogen, which has a very feeble illuminating power, must deteriorate the richer gases which have been previously generated and been passed on to the gas-holder, through the various other processes of the manufacture. Here is an explanation of some apparently anomalous actions on the part of certain companies, which have puzzled the brains of consumers. In some instances when the price of gas has been lowered to satisfy the public clamor, consumers have been surprised to experience an unasked for reduction in the quality as well as in the price. The injudicious mixture of coals has doubtless something to do with this result, but the maintenance of a too elevated temperature, and allowing charges to remain too long in the retorts, is probably a better reason than the former. The effects of neglecting to pay proper attention to carbonization being made so indubitably manifest, it is evident that this process must be correctly superintended, in order to insure successful results. The importance of enjoining upon engineers great care in the management of the carbonizing apparatus, is readily appreciated. Dr. HENRY has furnished much information regarding the various decompositions which take place in the retorts, and his data are valuable contributions to scientific knowledge. By analyzing the various products of the destructive distillation of coal, in different stages of the manufacture, he first elucidated the progress of the reactions, and demonstrated the uniformity of the generation of the various hydro-carbons. These experiments, made in a spirit of philosophic inquiry, have cast much light upon the practical management of the retort-house, and rendered the process of carbonization susceptible of ready comprehension. In this instance, as in many others, the researches of science have led the way for improvements in practical operations which have produced abundant results, when carried out on the large scale.

OUR CIVIL WAR.

It is known throughout the world that this once happy country is now involved in the horrors of a civil war. Eight out of the thirty-four States are in an organized armed revolt against the General Government, and, after months of insolent, unprovoked, and treasonable defiance of the constitutionally elected Administration, they have fired upon our flag, attacked a national fort, and, with a force of 7,000 men, poured from more than thirty guns, and for the space of four and thirty hours, a storm of red hot shot upon a brave officer of the United States Army and his handful of seventy men. Such was the cowardly attack upon Major Anderson and his little band in Fort Sumter, in the harbor of Charleston, S. C., on the 12th and 13th days of April last. The consequence of this atrocious and unparalleled act of cowardice, treason, and villainy has been to arouse the nineteen free States, with a population of twenty millions of people, who are rushing to arms, at once to vindicate the laws and punish the traitors.

In the minds of many this is believed to be a SECOND WAR OF INDEPENDENCE. The first War of Independence was made to assert the right of the people to establish a Republican Constitution, and form a Union and a Government. The present War is waged to maintain that Constitution, that Union and Government, against a band of conspirators who seek to overthrow it.

The National Capital is now garrisoned by a force of 25,000 men, and hundreds of thousands are pouring into the neighborhood of Washington, to secure it beyond contingency.

That this war will be brief, we sincerely hope; that it will be bloody, we greatly fear; that it will be successful in maintaining the Constitution, the Union, and the Government, to the entire overthrow of every traitor and rebel, we firmly believe and ardently desire.

As for ourselves, we have simply to record an undying love for our country and for its laws, at whatever cost of blood and treasure; and, painful as it is to see our personal friends, nay literally our own very relatives arrayed in arms against us, we will retrace not one step from the front rank in the contest, preferring to die by their hands rather than live to see the country dishonored in them.

THE MANHATTAN GAS-LIGHT COMPANY AS A HOME GUARD.—We have already recorded the generous and timely supply, to the public, of fresh water by this company, when the great Croton main burst during the winter. It is now about to protect the city by organizing its stokers and mechanics into a Home Guard. Some 2,000 men are now employed by the Manhattan Gas Company, many of whom were crazy to go South with the glorious 69th, Irish Regiment, which left for Washington on 23d of April. Col. Roome, President of the Manhattan Company, notified the men that their services would be required as a Home Guard, in which he is enrolling 1,000 of them, to protect the metropolis in the absence of our various regiments at the National Capital. Thus, the Manhattan Gas-Light Company at once furnishes LIGHT, WATER, and POLICE!!! *We venture to affirm that when the time comes, it will not withhold bread.*

IMMENSE LOSS OF GAS IN LONDON.—It is stated that six hundred and thirty millions of cubic feet of gas escape annually from the gas mains in London—an estimated loss of $700,000. Can this be possible? If true, or anything like true, is there not ingenuity enough to devise means to stop this enormous loss?

ON PETROLEUM AND COAL OILS.

BY ABRAHAM GESNER, M. D.

Ever since the introduction of Kerosene into the United States in 1853, and the public favor that oil immediately obtained, as a safe and economical illuminator, great efforts have been made to procure the best materials for the production of hydro-carbon oils. The cannel coal fields west of the Alleghanies, the British Provinces, and part of Central America have been explored in search of bituminous substances. Coals, bitumen, and asphaltum, capable of yielding oils, have been called for, and speculation in coal lands at one time led, or misled some worthy individuals almost out of their senses. No panic, whether commercial or political, checked the excitement of those who "made haste to grow rich." Manufactories were erected at great cost, and several at sites where there was no coal, or the coal was worthless for the production of oils. Patents were multiplied. Stills, retorts, and other machinery of the most unique patterns were made and tried. Coal-oil professors, or experts, became numerous; merchants, mechanics, clergymen, and lawyers suddenly became chemists by intuition, or otherwise, and apparently a new era had dawned upon the Western World by a sudden leap of the physical sciences and rapid progress of discovery. In this stage of the excitement, breweries, blacksmith shops, and barns were converted into laboratories and manufactories. A retort and still of moderate capacities were supposed to lay the foundation of a fortune, especially if they were worked by an expert who had found out some new chemical secret.

But with all this newly acquired science and skill, which still operates with unabated activity upon private finances, much of the oil produced bears with it unmistakeable evidences of olfactory offensiveness, lamp explosions have taken place, and some intimate that there is "an awful crusting of the wick." Many oil companies have failed altogether, and millions of dollars have been expended on experiments of great magnitude. Distilleries have been burned, others have been blown up. In the chemical line the most extraordinary deodorizers have been tried, and some whose common names delicacy forbids to register. Still be it remembered that the manufacture of good Kerosene and coal-oil has greatly increased, and the country is beginning to reap the advantages of a comparatively new and valuable improvement. Few are acquainted with the actual cost of rendering these oils pure, by the methods at present practiced, although by a recent improvement the expense of their purification has been greatly reduced.

While the excitement and speculation before mentioned were at their highest elevation, a simple fact and an accident turned the whole tide of public opinion, and the rage for coal has been merged into the rage for petroleum, designated on the other side of the Alleghanies as "well oil," "earth oil," &c. The oils distilled from coals were destined to meet with competitors, which for ages had been buried deeply in the earth. The reservoirs of petroleum distilled in the early ages of our planet, have been opened, and the oils, with carburetted hydrogen and salt water, flow at the surface in jets and streams which astonish the owners of the soil, and offer them fortunes without labor. The facts as recorded in these remarks have been collected by one who visits the oil regions occasionally, and makes a record of every new discovery.

The natural springs of petroleum were known to the native Indians, and the remains of their works, which consisted chiefly of vats to collect the oil, are still to be seen with trees growing upon them between the mouth of Oil Creek and Titusville, Pennsylvania. In 1845 Lewis Peterson, Esq., of Alleghany county, made two borings into the earth for the purpose of obtaining salt water; but instead of brine he pumped up petroleum or rock oil, and the springs have since yielded from thirty to forty gallons per day. This oil was sold under a contract and disposed of as Seneca oil, for the cure of sprains, rheumatism, and other diseases. After the introduction of coal oils into the market, this petroleum was distilled and found capable of yielding a fluid suitable for lamps, and which the early manufacturers denominated carbon oil. Encouraged by this small beginning, new borings were made, companies were formed, and speculation became prevalent in all directions.

The earliest settlers of the country observed an oil floating upon the waters that flowed from the springs; but the land was covered with dense forests of pine, which it was their object to fell and dispose of. The wells they sunk to obtain water for domestic purposes, were not deep enough to reach those vast collections of oil which existed beneath, and have already proved to be valuable and unexpected resources. Not more than three years have elapsed since it became known that large quantities of oil would flow from the earth by simply opening artesian wells. Since the above period no limits have been found to the oil region, which is known to embrace parts of Pennsylvania, Virginia, Ohio, Georgia, Kentucky, and Illinois. Compact bitumen, or naphtha, had been found in the county of Lambton, near the village of Iniskillan, Canada West. By boring into the earth the petroleum in large quantities has been discovered here also. It is of a denser quality than the ordinary oils obtained from the springs on the American side of the line. It, has a disagreeable odor, but yields excellent oil for lamps. It would be difficult to define the limits of the oleaginous district at present; but it is known to comprise several thousand square miles.

When the oil is first "struck" there is sometimes a discharge of gas with it, which escapes with such violence that the boring rod is driven into the air and the oil forms a jet of lively colors. The workmen after a time succeed in driving a plug into the pipe to stop the upward stream until barrels can be procured for its reception.* The naphtha does not always rise to the surface, but is pumped up from depths of 50 to 350 feet. The quantity of petroleum lost from the lack of vessels to receive it is very great.

The total number of wells yielding oil in the Pennsylvania oil region is about 250. 400 more have been projected, and some of them are advancing towards completion. The quantity of oil transported from this district from the 1st of October to the 1st of January last, has been estimated at 47,000 barrels, or 1,880,000 gallons, which at an average price of twenty cents per gallon amounts to $376,000.

The Pennsylvania oil district extends over eighty miles on both sides of the Alleghany river and valley, with an average breadth of twenty miles. A similar district has been discovered in Virginia on the line of the Kanawha river. Lands on both sides of that stream have been leased far and wide. Oil lands in this quarter have been leased at more than $1,000 per acre, and not less than 500 men are occupied in the oil business. Ohio is also beginning to pour forth her greasy liquid from Trumbull and Mahony counties. The rapid increase of the product may be understood from the fact that the quantity of oil that passed over the Sunbury and Erie railroad in January, 1860, was sixty-three barrels; in December of the same year there passed 6,431 barrels. The petroleum evidently bears some relation to the bituminous coals and shales of the western coal fields. In Canada it rises from silurian strata that contain neither coal nor coal shale. There have been many speculations regarding the causes which have produced these hydro-carbon oils believed by many to have been distilled from coals and coal shales of the Alleghany carboniferous region. But these petroleums are found in situations very remote from any kind of coal. May not the carbon of some oils have been derived from the carbonic acid of limestones and the hydrogen from water, oxygen going over to the metals and forming oxides???

The sale of animal oils and the spirituous liquids for burning in lamps, is much affected already by the discovery of the vast stores of petroleum which have been manufactured in the earth and providentially stored up for the use of the succeeding generations who shall inhabit this mighty continent. It might be supposed that the petroleums raised at the same locality or in the same district, would be alike in their composition and common characters; but such is not the fact. They vary much in their densities, and in the nature of the impurities contained in them. The lightest petroleums that have been examined by the writer, have a specific gravity of 0.791, and the most dense 0.903. The latter contains much tar and is employed as a lubricator on the axles of rail-cars.

At a few wells an oil has been obtained, usually not in large quantities, which is of a brown color—clear and transparent when viewed against the light. It burns well in lamps in its natural state; but in a short time an incrustation forms upon the wick, in which carbonate of lime and sulphate of soda were detected. Some of the petroleums contain chloride of sodium, others sulphate of magnesia and carbonate of lime. These salts materially affect the modes of purification.

There is a peculiar hydro-carbon entering into the composition of the American rock oils. Some of the oils resist the action of sulphuric acid and other oxidizing agents with great pertinacity; others are much charred by that acid. The petroleum oils sold in the market burn very freely and produce a fine white light, and they are not rivalled by the best descriptions of coal-oil or Kerosene. There can be no doubt that there has been some exaggeration regarding the productiveness of certain oil wells. As in almost every other valuable discovery, so has it been with petroleum; a few men have realized extraordinary profits, while others have suffered the loss of thousands of dollars. Finally the oil excitement will abate. The business will afford moderate profits, and the country and its commerce will enjoy the wonderful discoveries of petroleum.

* See drawing of oil well, AMERICAN GAS-LIGHT JOURNAL, Vol. II, page 187.

PROPOSED LAW FOR THE INSPECTION OF GAS AND GAS-METERS, AND PROTEST AGAINST THE SAME IN BALTIMORE, MD.

The following ordinances were introduced into the first branch of the City Council last month by Mr. Bandel, and referred to the Committee on Police and Jail:

The Ordinance "For the Inspection of Carburetted Hydrogen, or Illuminating Gas, in the City of Baltimore," in the first section provides for the annual appointment of one suitable, experienced, and competent person, known as a practical chemist, who is not a stockholder in nor an employee of any gas company of this city, as Inspector of Illuminating Gas, such as is now furnished by the gas company of this city, or such as may be furnished hereafter by any other company for the same purpose; who, before he enters upon the discharge of his duties, shall give bond, with approved security, to the satisfaction of the Mayor, in the penal sum of one thousand dollars, conditioned for the faithful discharge of the duties of the office, and take an oath or affirmation, before any officer legally qualified to administer the same, to faithfully, diligently, and impartially discharge the duties of his office.

The second section prescribes the duties of the Gas Inspector, which are to inspect, test, and determine the purity and illuminating power of the curburetted hydrogen, or illuminating gas, furnished by the gas company or companies of Baltimore to consumers, and to report to the Mayor at least once in each week, in writing, the condition of said gas as to purity and illuminating power, said weekly report, at the discretion of the Mayor, to be published in any two of the city papers to be designated by him.

The third section provides that the quality of the illuminating gas supplied by any Gas Company of the city of Baltimore shall be determined at the place where the Mayor and Gas Inspector shall place the necessary apparatus, and shall be, with respect to its illuminating power, such as to produce from the English Parliamentary Standard Burner, having fifteen holes and a seven-inch chimney, and consuming five cubic feet of gas per hour, under a pressure not exceeding that of a column of water one inch in height, a light equal in intensity to that produced by fifteen standard sperm candles of six to the pound, each consuming one hundred and twenty grains of sperm per hour, and such gas shall be, with respect to its purity, so far free from ammonia and sulphuretted hydrogen, that it shall not discolor either tumeric or red litmus paper, or paper imbued with acetate or carbonate of lead, when these are exposed to a current of gas issuing, for one minute, from an orifice of one-sixteenth of an inch in diameter, under the pressure at which the gas may be to consumers at the time of trial supplied. And shall be so far free from the carbonic acid gas that a stream from the above-named orifice, issuing under the above-named pressure, when passed into lime water or baryta water, for one minute, shall give no precipi-

tate, and such gas shall not contain more than ten grains of sulphur, in any form, in one hundred cubic feet of gas.

The fourth section requires that the pressure under which carburetted hydrogen or illuminating gas, shall be supplied to consumers in the city of Baltimore shall be so regulated that the burning pressure in any part of the city shall never be less than that of a column of water three-fourths of an inch in height, and shall never be greater than that of a column of water two inches in height.

By the fifth section, if that the carburetted hydrogen or illuminating gas, supplied by any gas company in the city of Baltimore, shall be at any time of less illuminating power, or of less purity, or shall be supplied under a greater or less pressure than according to the standards established by the third and fourth sections of this ordinance, it ought to be, and shall be so reported by the Gas Inspector. No money shall be had for any bill or account for the supply of the same for the week during which the said deviation from the above-named standards shall occur, and the quantity of inferior gas supplied in such week to any consumer shall be taken to be the proportion of the whole supply ascertained by dividing it by the number of weeks included in said bill; provided, however, that the said deduction shall not be made if it shall be proved to the satisfaction of the Mayor and Gas Inspector that the deviation from the above-named standards could not have been prevented by ordinary care and prudence, but was occasioned by some unavoidable cause.

The sixth section gives authority to the Gas Inspector to purchase the necessary apparatus and materials for the proper discharge of his duties, and place them where he, with the consent of the Mayor, may deem proper, the city to pay the expenses.

Section seven requires the gas company or companies supplying carburetted hydrogen, or illuminating gas to consumers in the city, to furnish the Mayor, annually, on the first of January, a statement of the number of cubic feet of gas consumed in the city during the preceding year. The said gas company or companies are empowered to assess on the consumers, in addition to the regular charge for gas consumed, sufficient to realize the amount of $800, which shall be credited to the city as cash paid on account of gas furnished the corporation.

Sections eight and nine provide for the drawing of the salary from the city treasury, and repeals all conflicting ordinances.

The second Ordinance, "For the Inspection and Sealing of Gas-Meters in the City of Baltimore," provides in the first section for the annual appointment of an Inspector and Sealer of Gas-Meters, who, being a suitable, experienced, and competent person, is not a stockholder in, or an employee of any gas company. He is required to give security in $1,000, and also take an oath or affirmation, before an officer legally qualified to administer the same, for the faithful discharge of his duties.

Section second requires the said Inspector and Sealer of Gas-Meters, when required in writing, and on the pre-payment of a fee, to inspect, examine, test, prove, and ascertain the accuracy of the registration of any and all gas-meters used or intended to be used for measuring or determining the quantity of curburetted hydrogen, or illuminating gas, consumed by any person or persons in this city, and when found to be, or made correct, within the meaning of this ordinance, to stamp, seal, or mark all such meters, and each one of them, with some appropriate, distinct, and intelligible device, to be approved by the Mayor.

The third section gives the necessary authority to purchase such apparatus as may be requisite, and which is to be paid for by the city.

Section four provides for the inspection and proving the gas-meter of any consumer at his written request, and in his presence if he so desires, upon the payment in advance, to the said Inspector and Sealer of Gas-meters, the sum of —— cents for each and every meter removed from the premises, proved, tested, sealed, and replaced; and if any meter, on being so tested, shall be found to register inaccurately, as defined by this section, to the injury of the consumer, the fees paid by said consumer shall be returned, and a like amount shall be paid to the Inspector and sealer by the gas company whose manufacture of gas has been consumed, as a remuneration for the removal, testing, correction, sealing, and replacing of such meters, and every such meter shall be considered correct and sealed accordingly, which shall register quantities varying from the true standard measure of gas, if not more than two per centum in favor of either the company or the consumer; the apparatus used by the Inspector, and the mode of testing practiced by him, to be approved by the Mayor, the Inspector of Gas, and Presidents of the gas companies.

Section five prohibits any new meter to be furnished or put in use in this city, by any gas company, which shall not have been previously proved to be correct, and sealed by the Inspector and Sealer authorized by this ordinance, except during such time as, from any cause, the office shall be vacant, or said Inspector and Sealer shall, after request made, refuse, or neglect to prove, and, if correct, seal the meters furnished at his office, by the gas company, for that purpose; and for said proving and sealing the company shall pay said officer the sum of —— cents for each and every new meter so proved and sealed as aforesaid. Any gas Company convicted before a Justice of the Peace of the violation of the provisions of this section of this ordinance, shall forfeit the sum of ———— dollars, and a further sum of ——— dollars for each and every day that such meter is allowed to be continued in use after a notice, ordering its discontinuance, has been served upon the company by the Inspector and Sealer of Meters.

Section sixth provides a penalty against any Company using a gas-meter condemned by the Inspector and Sealer, on the premises of a consumer, and a further penalty for each and every day such meter is allowed to remain after notice is given by the Inspector for its removal.

Section seventh renders it the duty of the Inspector and Sealer, when informed by a consumer that the gas company has charged more than is actually used, and he is desired to adjust the account, he shall examine the bills rendered for the corresponding and two preceding quarters, and the state of the meter at the time of the consumer's application for his services, and adjust the accounts between the parties, both of whom shall submit to his decision, and pay and receive accordingly. If the bill is found to be correct, the consumer shall pay a fee of —— cents, and if not correct, the company shall pay a like sum to the Inspector.

Section eight provides that, if requested, the Inspector and Sealer shall examine the meter on the premises of a consumer, and impart to him such instructions relative to filling with water or spirits and regulating the meters, for which he shall receive from the consumer —— cents.

Section nine requires the Inspector and Sealer to enter in a book, the day of testing, number, size, name of manufacturer, and registration of any meter proved and sealed, or condemned. Also the amounts of bills adjusted, and premises visited for the giving instructions. He is to receive an annual salary of —— dollars in addition to the fees as prescribed in this ordinance, but no fees are allowed where the Mayor and City Council, in their corporate capacity, are concerned.

Section tenth provides a penalty of —— dollars, or imprisonment in jail for —— days, on conviction of any person counterfeiting or defacing the seal placed by the Inspector and Sealer upon any gas-meter.

Section eleventh repeals all ordinances or sections of ordinances inconsistent with the above.

PROTEST.

To the Honorable the Mayor and City Council of Baltimore:

The Gas-Light Company beg leave to memorialize your honorable body in regard to the two ordinances offered in the First Branch of the Council, for the inspection of gas and meters.

They respectfully protest against the passage of those ordinances in their present form, and desire, briefly, to set forth the reasons of their objections.

They make no objection to a proper provision for testing meters. Their objection to the ordinance having that object, is directed against the seventh section, which gives the Inspector power to adjust accounts; but they suggest that in case of a difference of opinion between the Inspector and the officers of the company as to the testing of a meter, provision should be made for a decision by a competent umpire to be called in.

They consider the enactment of the ordinance for the inspection of gas, as beyond the authority of the city, and an invasion of the chartered rights of this company.

The Act of 1857, ch. 417, even if it were not itself unconstitutional, in part, has not been re-enacted by the Code, and the power of the city on the subject seems only to be found in sec. 28, art. 4, of the Code of Local Laws. "To establish and regulate inspections, subject to the present or future laws of the State."

An inspection may be defined to be an authoritative examination into and declaration of the quality of articles, bought and sold, which differ in degrees of excellence, and character of their composition. In the article of whiskey, the inspection determines the proof; in flour, the quality.

No inspection law ever determined that all whiskey distilled and sold, should be of a particular proof; nor all flour manufactured, of a particular fineness.

The decisions of the courts place gas companies on the same footing as other manufacturers and sellers of articles. There can be no greater power to compel gas companies to make gas of a given illuminating capacity, than there is to compel all makers of candles to produce candles equal to sperm.

Inspection is confined to deciding what an article is, not what it ought to be or might be.

The provision on the subject of pressure, can certainly not relate to inspection. The city can have no power to control the company in the use of their own machinery. Those parts of both ordinances which authorize the Inspector to adjust accounts, and which fix the kind of evidence which is to prove bills, are so clearly the assumption of the powers of a court and jury, that the company hardly suppose they will be pressed.

Independent of the want of power, there are objections to the ordinance for inspecting gas, which the company are able to prove to the satisfaction of any one who will examine the facts.

The minimum standard is too high. The company claims to make gas of as good material as at all within reach, and as good as any coal gas made elsewhere in this country, but no reasonable person would insist on gas being of greater power than is by this ordinance made a minimum. The inspection is not to be made at the works, but anywhere in town. And the company is not only to make 15 candle gas, but as much better as will keep it 15 candles anywhere on a long range of pipes, and in all weather.

To keep a standard of 15 candles and guard against the various causes which affect the manufacture and the quality of the gas in its passage through the pipes, the company must keep its ordinary standard several candles higher than 15.

The photometer by which the test is to be made, is an imperfect instrument, varying somewhat with the eye of the observer, and a difference in this respect must be guarded against by a still further increase of quality. Nowhere but in England has any standard been fixed for gas, and there, with all the advantage in the superiority of coal, the minimum standard for coal gas is 12 candles.

The regulation for freedom from sulphur and ammonia they can show to be impracticable in any manufacture on a large scale. The expense also would be very heavy, while the additional condensation required to free the gas of ammonia, diminishes the illuminating power.

To say that the company must furnish gas at this expense of purification, and at this minimum standard, is not to inspect but to fix the price of gas.

Careful experience has proved that the city could not be supplied with the limit of pressure fixed by the ordinance.

The difference of pressure caused by the different consumption of neighboring consumers on the same capacity of tubing, and between dwellings and churches and theatres, would alone require a wider limit. In addition to this, the variation in the levels of the mains is as great as 200 feet.

When the company has lowered the pressure to accommodate the upper part of the town, consumers in

the low parts have complained of insufficient light. No more pressure is put on than necessary, and any person may regulate his own gas by a stop-cock at his meter.

This ordinance is evidently taken from the Acts of Parliament, though under different provisions, and much more stringent than any of them. The Acts of Parliament are not inspection laws. They are laws to regulate gas companies. They not only fix a standard, but price, and in some instances limit profits and dividends. They proceed from power vested in Parliament which the Mayor and City Council do not possess. In their material parts they are incorporated into the charters of the companies. Your memorialists confidently say, that the power to pass this ordinance can only co-exist with a power to alter the charter of this company. The relation of the city to this company may be alluded to here.

If the increased expense which this ordinance would cause, would require an increase of price to private consumers, who now pay $2 50 a thousand feet, the city can hardly expect the company to continue to light the city lamps, as it now does, at about 80 cents a thousand feet. To carry out this ordinance, if we should consent to work under it at all, the cost to the city must be greatly increased.

The company would here repeat what they have said at other times, that complaints in regard to gas are not confined to Baltimore,—they exist all over this country, and in England.

The dissatisfaction of the consumer with the producer, when the one is a single company, and the other is numbered by thousands, is natural and universal.

The company is ready to show itself clear of any reasonable ground of complaint. Those who conduct it are willing to do anything reasonable. If the public cannot be satisfied with a private company, they are willing to recommend the stockholders to sell to the city their works at cost.

While they do continue, however, to supply the city, they cannot submit to any unreasonable demand, to any invasion of their legal rights, or an unjust reflection on their motives or conduct. With great respect they ask at the hands of your honorable body, a careful examination, and a fair hearing in the premises.

COLUMBUS O'DONNELL, *President.*

J. H. MCCULLOCH,
ARCHIBALD STIRLING,
MARCUS DENISON,
AUSTIN JENKINS, } *Directors.*

SHOCKING CATASTROPHE AT THE OIL WELLS.—An awful catastrophe happened on the night of the 17th of April, on the "Buchanan Farm," in the oil regions of Pennsylvania. The gas from a spouting well took fire and exploded, killing seven men. Among them was Mr. Rouse, an ex-member of the Legislature. The "Buchanan Farm," on which over one hundred wells are yielding oil, was soon in flames, and all the wells are now on fire. The loss in oil, derricks, &c., is said to be immense.

MATERIAL FOR THE CROTON AQUEDUCT DEPARTMENT.—Proposals were lately received by this department for 1,800 tons five feet straight pipe; fifteen tons special castings; twenty-four feet of twelve feet straight pipe.

An immense amount of iron and earthen pipes will be laid this year in New York, Brooklyn, and Jersey City, unless the war should upset all municipal calculations.

BELLIGERENT GAS COMPANIES.—It is said that the existing war spirit has so far inoculated the gas-light companies, that they do not now even shut off the gas from a delinquent consumer, but by a *coup de Main.*

WARMING RAILWAY CARRIAGES.—A method of warming railway carriages, involving only a trifling expense, has lately been introduced on the continent of Europe. The waste steam of the engine is conducted from the escape-pipe of the engine, by means of a vulcanized india-rubber tube, to copper pipes, through which it circulates under the seats and floorings of the carriages. As soon as the train is set in motion the steam commences to circulate through all the systems of pipes, and warms the carriages—first, second, and third class equally; and, being connected with each other by India rubber tubing, they can be immediately detached or reunited at pleasure.

WHERE GAS-WORKS AND WATER-WORKS ARE WANTED.

We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

POST-OFFICE TOWNS IN THE UNITED STATES,

ARRANGED BY STATES AND COUNTIES,

Showing where Gas-Works and Water-Works are Wanted.

IOWA.

89 Counties, 1,074 Towns, 5 Gas-Works, No Water-Works.

(*Concluded from page* 311.)

Jefferson County.

Abingdon,	Germanville,	Pleasant Plain,
Absecom,	Glasgow,	Parsonville,
Botavia,	Harmony,	Salina,
Brookville,	Libertyville,	Walnut,
Fairfield, (c. h.)	Lockridge,	Wooster.

Johnson County.

Belle Air,	*Iowa City*, (c. h.)	Palestine,
Bon Accord,	Malvern,	Seventy-Eight,
Carthage,	Newport,	Seventy-Seven,
Copi,	Newport Centre,	Shueyville,
Danforth,	North Liberty,	Solon,
Frank Pierce,	Oxford,	Windham.

Jones County.

Anamosa, (c. h.)	Fuller's Mills,	Monticello,
Bowen's Prairie,	Highland Grove,	Scotch Grove,
Castle Grove,	Isabell,	Temple Hill,
Duane,	Johnson,	Walnut Fork,
Edinburgh,	Longworthy,	Wyoming.
Fairview,	Madison,	

Keokuk County.

Aurora,	Martinsburgh,	Talleyrand,
Butler,	Richland,	Webster,
Chandaller,	*Sigourney*, (c. h.)	White Pigeon,
Ioka,	South English,	Wimer's Mills.
Lancaster, (c. h.)	Springfield,	

Kossuth County.

Algona,	Irvington,	Lott's Creek.
Cresco,	Kossuth Centre,	

Lee County.

Belfast,	Dover,	Pilot Grove,
Big Mound,	Fort Madison,	Primrose,
Charleston,	Franklin Centre,	Summitville,
Clay's Grove,	Jeffersonville,	Vincennes,
Cono,	Jollyville,	Warren,
Croton,	Keokuk,	West Point.
Denmark,	Montrose,	

Linn County.

Banner Valley,	LaFayette,	Saint Marys,
Boulder,	Lisbon,	Sisley's Grove,
Cedar Rapids,	*Marion*, (c. h.)	Spring Grove,
Central City,	Mondieu,	Springville,
Centre Point,	Mount Vernon,	Valley Farm,
Dry Creek,	Nugent's Grove,	Waubeck,
Forfax,	Necot,	Wapsa,
Kingston City,	Palo,	Western College.
	Prospect Hill,	

Louisa County.

Burris,	Morning Sun,	Spring Run,
Cairo,	Ononwa,	Toolsborough,
Columbus City,	Palo Alto,	Virginia Grove,
Forest Hill,	Port Allen,	*Wapello*, (c. h.)
Grand View,	Port Louisa,	

Lucas County.

Argo,	Freedom,	Maceville,
Belinda,	Freeland,	Tallahoma,
Cedar Grove,	Greenville,	Time.
Chariton, (c. h.)	LaGrange,	

Madison County.

Brooklyn,	Heaton,	Queen's Point,
Charlottsville,	Middle River,	Saint Charles,
Clanton,	North Branch,	Winterset.
	Peru,	

Mahaska County.

Agricola,	Fremont,	New Sharon,
Auburn,	Granville,	*Oskaloosa*, (c. c.)
Belle Fountain,	Hopewell,	Peoria,
Cherry,	Indianapolis,	Rose Hill,
Flint,	Laredo,	Scott.

Marion County.

Attica,	English Settlement,	Newark,
Bennington,	Gosport,	Newbern,
Caloma,	Hamilton,	Pella,
Columbia,	Jola,	Plesantville,
Dallas,	Knoxville,	Red Rock,
Ely,	Mennon,	Wheeling.

Marshall County.

Albion,	Le Grand,	Reedsville,
Bangor,	Marietta,	Timber Creek,
Green Mountain,	Marshalltown,	Vienna.
Illinois Grove,	Minerva,	

Mills County.

Alps,	Glenwood,	Pacific City,
Cerro Gordo,	Indian Creek,	Wahaghbonsy,
Fayette,	Ingraham,	White Cloud.
	Mapleton,	

Mitchell County.

Cardiff,	Nelson,	Otranto,
Doran,	Newburgh,	Saint Ansgar,
Leoti,	North Bend,	Staceyville,
Mitchell,	Osage,	Wentworth.

Monona County.

Belvidere,	Mapleton,	Onawa City.

Monroe County.

Albia,	Georgetown,	Lovilia,
Avery,	Gray's Creek,	Osprey,
Bluff Creek,	Half-Way Prairie,	Weller.
Cuba,	Henn,	

Montgomery County.

Coe's Grove,	Red Oak Junction,	Sciola.
Frankfort,	Ross Grove,	

Muscatine County.

Atalissa,	Minerva,	Strawberry Hill,
Bower Landing,	Moscow,	Summit,
Durant,	Muscatine,	Sweetland Centre,
Fairport,	Pleasant Prairie,	West Liberty,
Melpine,	Prairie Mills,	Wilton Junction.

Page County.

Centre,	College Spring,	Noddaway Forks,
Clarinda,	Harder's Corner,	Tarkio.
	Hawleysville,	

Palo Alto County.

Emmittsburgh,		Paoli.

Polk County.

Adelphi,	East Des Moines,	Ridgedale,
Apple Grove,	Freel,	Rising Sun,
Avon,	Kirkwood,	Summerset,
Bloomington,	Peoria City,	Taylorsville.
Des Moines,	Polk City,	

Pottawatomie County.

Big Grove,	Crescent City,	Newtown.
Council Bluffs,	Macedonia,	

Poweshiek County.

Bear Creek,	Grinnell,	*Montezuma*, (c. h.)
Deep River,	Malcom,	Sugar Grove,
Forest Home,	Mill Grove,	Victor.

Ringgold County.

Caledonia,	Mount Ayer,	Redding,
Cross,	Prairie View,	Silver Street.
Eugene,	Providence,	

Sac County.

Sac City.

Scott County.

Allen's Grove,	Dixon,	Pleasant Valley,
Amity,	Gilbert,	Princeton,
Big Rock,	Le Claire,	Round Grove,
Blue Grass,	Linn Grove,	Walnut Grove,
Buffalo,	Mount Joy,	Wolcott.
Davenport,	New Liberty,	

Shelby County.

Manteno,	Shelbyville,	Simoda.

Story County.

Cambridge,	Nevada,	Sheffield,
Camden,	New Philadelphia,	Story City.
Iowa Center,		

Tama County.

Butterville,	Heath,	Spring Creek,
Buckingham,	Helena,	Tamanville,
Collins Grove,	Kinisaw,	Toledo,
Crystal,	Ola,	West Irving,
Eureka,	Redman,	Wolf Creek.

Taylor County.

Bedford,	Gravity,	Memory,
Brushy,	Litchfield,	Plattville.
	Lone Office,	

Union County.

Afton,	Myers,	Platt,
Kings,	Olio,	Union City.
Lexington,	Philo,	

Van Buren County.

Benton's Port,	Iowaville,	Pittsburg,
Birmingham,	*Keosauqua*, (c. h.)	Portland,
Bonaparte,	Kilbourn,	Upton,
Business Corner,	Lebanon,	Utica,
Farmington, (c. h.)	Milton,	Vernon,
Gainesborough,	Mount Sterling,	Winchester.
Hickory,	New Market,	
Home,	Oak Point,	

Wapello County.

Agency City,	Christiansburgh,	Kirkville,
Amador,	Competine,	*Ottuwga*, (c. h.)
Ashland,	Dahlonega,	Point Isabelle,
Chillicothe,	Eddyville,	Port Richmond.
	Greene,	

Warren County.

Carlisle,	Hartford,	New Virginia,
Doorville,	*Indianola*, (c. h.)	Palmyra,
Port Plain,	Lacona,	Pyra,
Hammondsburgh,	Lawrenceburgh,	Sandysville,
Handsome View,	Lynn,	Somerset.
	Montpelier,	

Washington County.

Amboy,	Dutch Creek,	Valley,
Brighton,	Marcellus,	*Washington*, (c. h.)
Clay,	New Haven,	Wossonville,
Crawfordsville,	Pottsville,	Yatton.
Davis' Creek,	Richmond,	

Wayne County.

Bethlehem,	Genoa,	South Fork,
Cambria,	Grand River,	Warsaw,
Clio,	Lewisburgh,	Wayne Cross Roads,
Corydon,	New York,	Xniffin.
	Promise City,	

Webster County.

Belleville,	Hesperian,	Otho,
Border Plains,	Homer,	West Dayton,
Fort Dodge,	McLaughlin's Grove,	

Winnebago County.

Forest City.

Winneshiek County.

Aquilla Grove,	Castalia,	Moneek,
Bluffton,	Decorah,	Morgan,
Burr Oak,	Fort Atkinson,	Old Mission,
Burr Oak Springs,	Frankville,	Plymouth Rock,
Calmar,	Freeport,	Twin Spring,
Canoe,	Hesper,	Winneshiek.
	Locust Lane,	

Woodbury County.

Morris,	Sergeant's Bluff,	Smithland,
	Sioux City,	

Worth County.

Bristoe,	Lena,	Oakvale,
	Northern,	

Wright County.

Bach Grove,	Fryeburgh,	Luni,
Belmond,	Gold Field,	Rosedale.

PATENTS.

Inventors are informed that Patents are procured at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, through F. C. TREADWELL, Jr., Esq., an experienced Patent Agent and Expert, in the United States, and in all other countries where Patent Laws are in force.

UNITED STATES.

765.—C. F. Anderson and Sylvester Davis, of Claremont, N. H., for an improvement in Water Elevators:

We claim having the flexible girding brake, H, attached to the shifting lever, I, which operates the sliding windlass, B, when the said lever has both a lateral and longitudinal movement, and when said parts are otherwise constructed and arranged to operate with each other in the manner shown and described.

The arrangement of the adjusting hook, J, with the girding strap in the manner shown and described.

The arrangement of the partition, O, and rear aperture, h', with the curb A', windlass and brake, in the manner and for the purpose shown and described.

[This invention relates to an improved water-elevating device designed for domestic purposes, and has for its object the ready elevation of the water and the discharging of the same automatically from the bucket, and also has for its object the gradual lowering of the bucket in such a manner that the same will be checked automatically and allowed to descend with a moderate speed, and the bucket thereby prevented from being injured. The invention has further for its object the preventing of the accumulation of ice on the windlass or parts pertaining thereto, a contingency which would prevent the proper action of the brakes.]

786.—Milton Dilts, of Columbia City, Ind., for an Improvement in Water Wheels:

I claim the arrangement of the adjustable slides D, with the peculiarly-formed buckets, C, in the manner and for the purposes shown and described.

[This invention relates to an improvement in that class of horizontal water-wheels which receive the water at their centre and discharge it at their periphery. The invention consists in a peculiar form of the buckets of the wheel, in connection with adjustable plates and with or without a conical deflector, whereby the discharge of the water from the wheel may be regulated according to the supply, and the best effect obtained under varying heads without an unnecessary expenditure of water.]

787.—John S. Elliott, of Philadelphia, Pa., for an Improvement in Gearing for Gas-Meters:

I claim the application to gas-meters the gearing described, the same being constructed and arranged to operate in combination with the openings in the face-plate, substantially in the manner described and for the purpose specified.

800.—Dennis Hayes, of New York City, for an Improvement in Pumps:

I claim the placing of the valves K, L, in conical or taper plugs, G H, which are fitted in the water passages, B C, substantially as and for the purpose set forth.

I further claim the combination of the double valve, K, with the single valve, L, and the conical plugs, G H, arranged for joint operation as and for the purpose set forth.

[The object of this invention is to simplify and economize in the constructing of double-acting or force pumps, and at the same time render the valves very accessible, so that they may be readily repaired and kept in working order, and only two of them required in the construction of the pump.]

806.—W. H. Locke, of Canton, Pa., for an Improvement in Scrolls of Water-Wheels:

I claim casting the joint consisting of the ear-piece, m, opening l, and pillar, n, entire with the divisions of the scroll, as set forth.

826.—J. S. Shalier and G. F. Folsom, of Roxbury, Mass., for an Improvement in Water Meters:

We claim the described arrangement of the induction chamber, B, the two float chambers, C C', the eduction chamber, E, the chambered valve, F, and its ports, the two floats, D D', and the valve-tripping apparatus, the whole operating together in manner and under circumstances substantially as specified.

854.—Luther Atwood, of New York City, for an Improvement in the Manufacture of Hyro-carbon Oils:

I claim the direct application of ice or ice and salt to the condensation of hydro-carbon oil vapors, substantially as described and substantially for the purpose set forth.

I also claim bringing the vapors by a descending current in contact with the surface of the ice or ice and salt, substantially as described.

862.—J. H. Breckenridge, of Meriden, Conn., for an Improved Cap for Oil Cans:

I claim as an improved article of manufacture, a sheet metal can cap, having a portion of its exterior surface raised and formed into a groove of the form shown and described, for the purposes set forth.

866.—J. T. Clegg (assignor to himself and H. Coulter), of Philadelphia, Pa., for an Improvement in Lamps:

I claim, first, An open cap, so constructed that one side will impinge the flame, while upon the opposite side a space is left between the wick tube of the lamp, and the side of the cap, for the purpose of creating a draft, and thus supplying the requisite quantity of oxygen to the flame at the point of combustion, substantially as set forth.

Second, The combination of a sliding regulating tube (with or without flues) with an open cap, substantially in the manner and for the purpose specified.

883.—Frederick Heidrich, of Philadelphia, Pa., for an Improvement in Lamps:

I claim the employment of a fluid-tight chamber over the wick pinion in combination with the wick tube, substantially in the manner and for the purpose described.

884.—R. W. Hunt and M. Kennedy, of Galesburgh, Ill., for an Improvement in Water Elevators:

We claim the arrangement of the self-opening valve, F, with the bucket, E, and lifting-rope, G, when combined with the rod, J, ring, d, spout I, projections, f, plates, e, and drops, g, as and for the purposes shown and described.

[This invention consists in the employment or use of a chain and counterpoised valvular bucket, in connection with a hinged spout a and bucket-sustaining and bucket-liberating devise, whereby water may be elevated with facility for domestic purposes, and a very simple device obtained for the desired purpose.]

887.—T. Jacobs and N. J. Wilkinson, of St. Louis, Mo., for an Improvement in Apparatuses for Purifying Water:

We claim arranging the corrugated plate or collector, D, in connection with the feed-pipe and within the boiler, as described, for the purpose of cleansing the feed water before it mingles with that in the boiler and after it has passed through the purifier, in the manner described.

888.—Joseph Leeds, of Philadelphia, Pa., for an Improvement in Furnaces for Heating Buildings:

I claim the top plate, A, and the side plates, B B, constructed in the form described, the division plates, C D E, the heat radiating flues K K, opening through the top plate A, and communicating through the plate, C, with the fresh air chamber, G, as described, the deflecting plate, M, constructed with the openings, 2 2 3, as described, and the fresh air distributing pipe, N; the said parts being arranged in relation to each other, the chambers, F and G, and the flue, L, substantially in the manner described and for the purposes specified.

889.—J. G. Leffingwell, of Newark, N. Y., and G. W. Thompson, of New York City, for an Improvement in Gas Burners:

We claim, first, A gas burner, A, having in combination a tip, a flexible diaphragm, C, and valve, D, arranged in the manner and for the purposes set forth.

Second, The ring, b, with its inclined sides and hooked edge, as described, for the purpose of securing the diaphragm.

892. G. H. Magersuppe, of New York City, for an Improvement in Lanterns:

I claim the portable lantern described, capable of being readily folded into the shape and size of a pocket-book, in the manner and for the purposes substantially as set forth.

900.—A. M. Perkins, of Springfield, Mass., for an Improvement in Pumps:

I claim, first, The construction of a valve, as described, composed of a cylinder fitting into a corresponding groove in a suitable seat, the operation of opening and closing being performed by the rising of the cylinder out of, and the falling of the same into the groove, as aforesaid, when constructed and operated substantially as described.

Second, The combination of a movable valve seat with the valve chests and covers, b b, when situated under the cylinder, substantially in the manner set forth.

911.—A. R. Turner, of Malden, Mass., for an apparatus for Trimming Wicks:

I claim the organized apparatus described, for trimming the wicks of lamps, the same consisting substantially of the knife, g, attached to a traveling carriage, which is made to move back and forth in a horizontal plane, while the wick is firmly held by any suitable holding device during the cutting operation, as set forth.

919.—Martin Wilcox, of Middlebury, Ohio, for an Improved Steam Pump:

I claim the arrangement of the chamber, A, float, F, pipe, N, and valve, E, in combination with the valves, M and J, with the pipes, H, constructing and operating in the manner and for the purposes substantially as described.

I also claim the chamber, T, with the partitions, O O, and valve, I, in combination with the pipes, B B', valve, D, condenser, C, and pipe, G, constructed in the manner and for the purpose substantially as set forth.

938.—Ransom Bartle, of Independence, Iowa, for an Improvement in Water Elevators:

I claim the arrangement of the sliding treble-flanged drum, constructed as shown with the brake lever, G, shaft, D, straps, h l, separated straps, N N, and bucket, K, all in the manner and for the purposes shown and described.

[This invention consists in combining with a plunged drum which turns loosely on a crank shaft, and which is allowed to receive an end play on said shaft, a friction brake and rest, and a clutch wheel, arranged whereby the drum may be kept under perfect control in winding up the bucket strap, and also in lowering the bucket into the well. It consists in attaching the strap, by which the bucket is hung to the flanged drum, by a strip of some elastic material of a suitable length and strength for the purpose of preventing the bucket strap from breaking should the bucket descend suddenly into the well.]

989.—Anson Judson, of Brooklyn, N. Y., for an Improvement in Lamps:

I claim the contraction of the cone, A, or its equivalent of glass or other transparent material, as and for the purpose described.

Things Ancient, Quaint and Rare.

THE COMMONWEALTH MERCURY,
From Thursday, September 2, to Thursday September 9, 1658.

ADVERTISEMENTS.

SEpt. 3., in the night, was ſtole or loſt from Mr. Allen's paſture in HASLEIGH near MALDON in ESSEX, a well ſpread Bay Gelding about 15 hand high, with a black mane and tail, a great white blaſe in his face, almoſt ball-faced, the ſkin of his upper lip white, three white feet, a knot upon one of his fore-legs like a ſplint, between the knee and the paſtern half as big as a Hen egg, but longer, ſeven years old, a good drawer, and will amble a little. If any perſon ſhall give notice of him to Mr. RICHARD KINGSMAN a Grocer, at the yellow Spread-Eagle in GRACE-CHURCH-STREET, LONDON, or to the ſaid Mr. ALLEN, he ſhall have forty ſhillings reward.

SEpt. 5., loſt or ſtolen out of a paſture near to ENFIELD, a Flea-bitten Grey Gelding, with a thick head and a wide jaw, his ears have been tied up; he hath a black ſpot upon his left ſhoulder, on his left foot the hair ſtands up, a long tail if not cut ſince, about ſixteen handful high, alſo an Iron grey Gelding, 15 handful high, with two ſpots behinde upon the Ham. If any one give notice to Mr. EBBE at the GEORGE in WEST SMITHFIELD they ſhall have forty ſhillings for their pains.

WHoſoever deſireth to be cured of the Rupture or Broken Belly, of any ages to threeſcore and ten, let them repair to one ROWLAND PIPPIN, who will by God's help make them whole; the poor for charity, the mean for little, the rich for reaſonable terms: He will ſtand to all charge for the Cure, until they ſhall finde by experience their own good. He hath taken a Chamber in the STRAND, at the Three Pigeons, near Somerſet-houſe, where you may find him all the Forenoons until nine of the clock, and from one to five in the afternoon. He lives in the countrey at SUTTON-BREWHOUSE near Gilford in Surrey; his Father, Brother, and himſelf, have uſed this practice three-ſcore years in the Weſt, where the name of PIPPIN is remarkable for ſeveral cures of this nature.

From Thursday, Novemb. 18, to Thursday, Novemb. 25, 1658.

THere is lately a way found out for making Clocks that go exact and keep equaller time than any now made without this Regulator (examined and proved before his Highneſs the Lord Protector, by ſuch Doctors whoſe knowledge and learning is without exception) and are not ſubject to alter by change of weather, as others are, and may be made to go a week, or a moneth, or a year, with once winding up, as well as thoſe that are wound up every day, and keep time as well; and is very excellent for all Houſe Clocks that go either with Springs or Waights: And alſo Steeple Clocks that are moſt ſubject to differ by change of weather. Made by AHASUERUS FROMANTEEL, who made the firſt that were in ENGLAND. You may have them at his houſe, on the Bank-ſide in MOSSES-ALLEY, SOUTHWARK, and at the ſign of the Maremaid in LOTHBURY, near BARTHOLOMEW-LANE end LONDON.

A Funeral Ode on his Highneſs, written in Heroick Hexameter, is now extant and publickly to be ſold.

WATER-GAS WORKS.

WATER-GAS.—APPLETON & GRAHAM,
AGENTS FOR THE
NEW ENGLAND WATER-GAS CO.,
UNDER THE SANDERS PATENT,
Are prepared to give estimates for Works, and guarantee the cost of Gas not to exceed One Dollar per 1000 cubic feet.
☞ Coal or Rosin Gas-Works altered at small expense.
A. & G. continue as heretofore to erect their improved Rosin and Rosin-Oil Works for Private Dwellings, Factories, &c. For further particulars apply at 56 Washington st., Boston.

SITUATIONS WANTED.

A FIRST-CLASS GAS-ENGINEER, who has filled one of the first positions as such in the United States, wishes an engagement in a Gas-Works.
Full particulars will be given on addressing M. F. H., Post-office, Philadelphia.

STOP-COCKS, &C.,

DANIEL THOMPSON, Machinist and Manufacturer of Stop-Cocks, Fire-Plugs, &c., for Water-Works, Stop-Cocks, Valves, Drip Pumps, &c. for Gas-Works, No. 133 Elfreth Alley, Philadelphia.

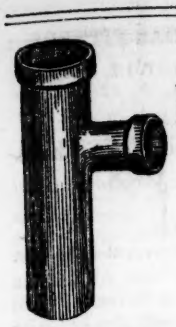
MISCELLANEOUS.

MESSRS. J. WRIGHT & CO., CONSULTING ENGINEERS and SOLICITORS of PATENTS, No. 42 Bridge street, Blackfriars, London, E. C. Patents for inventions obtained in all countries where Patent Laws are in force.

PHOTOMETER APPARATUS and Room for Sale.—The Room is about 6 feet wide by 12 feet long, painted black inside and screwed together. It can be taken down and boxed for transportation. All the pipes and fittings are complete for immediate use. Address PHOTOMETER, care of the AMERICAN GAS-LIGHT JOURNAL, 89 Nassau street, N. Y.

UNION WIRE-WORKS.

ROBERT McMURRAY & CO., No. 29 Fulton Street, New York, Manufacturers of Copper, Brass, and Iron Wire Cloth for Gas Works, all kinds of Foundry Riddles, Sieves, and Screens. Improved Wire Window Shades, Wire Bolting Cloth, Duster-Wire, Wire Cloth for fanning machines, Rosin, &c., Locomotive Wire, Fire Guards, Ornamental Wire Work of every description. Patent Improved Wove and Laid made, repaired and designed to order.



GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE,

FROM

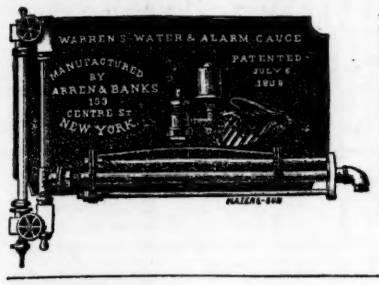
JOSEPH CLIFF,

Wortley Fire-Brick Works, Leeds, England.

T. W. PARMELE, Agt.,
No. 4 Irving Place, N. Y.

WARREN'S PATENT WATER & ALARM GAUGE,

For Protecting the Flues and Preventing Steam-Boiler Explosions.



This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

WARREN & BANKS,
153 Centre st., corner of Canal st., New York,
Where a Gauge is constantly in operation.

JOHN RUSSELL & CO.,

PATENT TUBE MAKERS,

THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE,

69 UPPER THAMES ST., & 5 CHARLES ST., SOHO, LONDON;

AND 35 GRANBY ROW, MANCHESTER, ENGLAND.

The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lap-welded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water. Galvanized and Composition Tubes. Chandeliers, and every kind of Brass work for Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST-IRON PIPE AND GAS-METERS.

All Goods Warranted.

THE

STERLING GAS-REGULATOR,

Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light. In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW YORK,

To keep in order, and always maintain the pressurs of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

GENGEMBRE'S PATENT

NON-FREEZING AND NON-EVAPORATING

GAS-METER FLUID.

By the use of this Fluid, the WET GAS-METER of ordinary sonstruction is rendered the most perfect and most reliable Gas Measuring Instrument ever offered to Gas Companies. In winter the Meter will continue to work equally well, *however exposed it may be;* and in summer the level of the Fluid remaining constant without refilling, the measurement of the Gas will be both uniform and constant.

The use of this Fluid is both easy and economical, and Gas Companies desirous of using it will be licensed on liberal terms. For further particulars, and certificates of parties having used the same for over three years, and for city rights, apply to

A. DOISY, Box 1180,
General Agent and Attorney for GENGEMBRE'S PATENT.

N. B.—No Sales of Territorial Right, or Licenses for using my Patent will be valid, without being ratified by my Signature, as I have no Agent authorizeed to execute the same.

H. P. GENGEMBRE, PATENTEE, Box 48, Alleghany City, Penn.

BURTIS' PATENT COMPENSATING COUNTERBALANCE FOR GASOMETERS.—This Improvement consists in making the attachment to the Gas-Holder by counterweights in such a manner as to effectually prevent it from getting out of level so as to bind, and also to prevent any escape of Gas at Cup or Hydraulic seal, where the Holder is on the Telescopic plan. Holders that work out of level are thus evenly balanced, and prevented from binding or lodging against Tank-wall and falling down, thereby being rendered unfit for service. Where Holders or sections of Holders cannot be used on account of the above difficulties, this arrangement will remove them, and place the Holders in good working order; moreover, with this attachment, deep tanks are not necessary.

BURTIS' COUNTERBALANCE has been in use for three years at the Gas-Works, Chicago, Ill. Its resistance to high winds and snow-drifts is alone sufficient to recommend its general adoption. For engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, p. 221. Address P. T. BURTIS,
Engineer Gas-Works, Chicago, Ill.

GAS THERMOMETERS FOR ascertaining and regulating the temperature of the gas while passing through the purifiers into the station meters. For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

A LAMP CHIMNEY THAT WILL NOT BREAK! This invention possesses many advantages over the glass chimneys now used on Coal-Oil Lamps. They do not break from the heat, falling, cleaning, or any ordinary usage.

They fit all the burners now in use.

For particulars call or address the the Patentees and Manufacturers,
HORNING & HUMPHREY,
No. 321 N. Second St.
Philadelphia.

McKINNY & KELLY,

MANUFACTURERS OF

COAL-SCOOPS AND COKE-BARROWS,

FURMAN ST., near Fulton Ferry, Brooklyn, N.Y.

F. BUTTS & CO.,

(Successors to BUTTS & KENDALL,)

DEALERS IN THE CELEBRATED

STERLING COAL,

PITTSBURGH AND OTHER GAS-COALS,

CLEVELAND, OHIO.

We beg to call the attention of Gas-Light Companies to the following, from which (and others), and the universal expression of Gas Men, as to the superior quality of

STERLING COAL,

we believe that it is THE BEST COAL IN THE COUNTRY.

From the Manhattan Gas-Light Co., N. Y.

Gentlemen—Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9520 cubic feet of 15 candle Gas per ton of 2240 lbs., and 41 bushels of Coke weighing 1465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke.

I am, Gentlemen, Your Obedient Servant,
CHARLES ROOME, *President.*

From the Rondout and Kingston, N. Y. Gas-Light Company.

Gentlemen—The 600 tons of Coal ordered from you in August, 1859, has now been in use over four months, to my entire satisfaction.

Its average yield is 4 40-100 feet, and a good strong light. The Coke produced equal, both in quality and quantity, to best English Coking Coals. It burns very freely, with little clinker. In purification it is economical, using no more lime than New Pelton. It is superior to any American coal I ever used. I shall be pleased to give you any further information at my office in New York.

WM. W. HAGUE, 552 Broadway.

From the Sandusky, O. Gas Co.

Gentlemen—This Company has used your Sterling Coal since July 3d, 1856, and are still continuing the use of it with satisfaction to the Company and consumers. The average product has been 8,620 feet of Gas per ton of 2,000 lbs, and 37 bushels of Coke of very superior quality. The Gas is as good as that obtained from Pittsburgh coal. I consider it the best coal ever used in our works.

I am, Gentlemen, Yours Respectfully,
WILLIAM HUDSON, Sup't and Sec'y.

From the Toledo, O., Gas-Light Co.

Gents:—Your favor of the 18th inst. to hand and noted.

The Sterling Coal received from Messrs. Butts & Co., the last summer and fall, fully sustains the character it has as a Gas Coal, from previous use in our works. We think the quality of Gas is very good, a little better than that produced from the coal had of them the year previous—yielding 8,666 feet per ton of 2,000 lbs., and 36 bushels of Coke, of very good quality, well adapted to our use.

Respectfully Yours,
GEO. SPENCER, President.

From the Buffalo, N. Y., Gas-Light Co.

Messrs. F. BUTTS & Co.—The Sterling Coal we have had from you we find to be an excellent Gas Coal. The yield of both Gas and Coke is good. The illuminating power of the Gas is high and the quality of the Coke is very good.

ROBERT ROBSON, Foreman Gas-Works.

From the Cleveland, O., Gas-Light & Coke Co.

Gentlemen—This Company has used between 3,000 and 4,000 tons of your "Sterling Coal," and are still using it with satisfactory results. We find the average product of a ton of 2,000 lbs. is about 8,800 feet of Gas, and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9,000 feet, and the Coke of very superior quality.

The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke is better adapted to our use.

Yours truly,
T. DWIGHT ELLS, Secretary.

From the Albany, N. Y., Gas-Light Co.

Messrs. F. BUTTS & Co.—*Gentlemen*—We have been using your "Sterling Coal" at these works for two years, finding it all that is important in Gas-making Coal, as respects yield and quality of Gas, and freedom from Sulphur—as much so as any of the Coking Coal now in use. We are disposed to contract for a further supply of the same quality. Very Respectfully,
PAUL A. SABBATON, Sup't.

From the Troy, N. Y. Gas-Light Co.

Messrs. F. BUTTS & Co.—*Gentlemen*—The Coal we have used the past year at our works has been mostly "Sterling." It has given us full satisfaction in every respect. S. S. DAUCHY, Sup't.

The following analysis of Sterling Coal was made by Prof. J. LANG CASSELS, Professor in the Cleveland, O., Medical College, who stands at the head of his profession as a Chemist, and any statement made by him can be relied upon with safety.

Sp. gr.	1,288	
Hygremaeric Moisture,		1.85
Volatile Combustible Matters,		34.15
Coke, (clear and porous,)		64.00
		100.00
Fixed Carbon in the Coke,	62.00	
Ashes, (yellowish white,)	2.00	
	64.00	
COMPOSITION OF ASHES.		
Silex,		0.80
Al mini,		0.45
Sulphate of Iron,		0.75
		2.00
Per centage of Sulphur,		0.2

J. L. CASSELS, M. D.,
Prof. of Chemistry, Clev. Med. Col.

P. S.—The specimen from which the above analysis was made, was taken by myself from a car load, and may be regarded as a fair average; in fact this Coal is very uniform in its characteristics. It also yielded 4 per cent. more gas than the Pittsburgh Coal. J. L. C.

We would also refer to Gas-Light Companies in the following places:

NEW YORK CITY, (Manhattan and New York Cos.,) BROOKLYN, ALBANY, TROY, WEST TROY, ROCHESTER, OSWEGO, RONDOUT, KINGSTON, ALBION, BROCKPORT, SENECA FALLS, ELMIRA and LYONS, in the State of New York; CLEVELAND, TOLEDO, SANDUSKY, NORWALK and OBERLIN, in Ohio; DETROIT, ANN ARBOR, GRAND RAPIDS and KALAMAZOO, in Michigan; COBURG, in Canada; Chicago, Ill., and two Companies in MILWAUKIE, Wisconsin.

The extensive Mines in Pennsylvania, known as the Sterling Hills, (which are the highest in that part of the State,) are wholly under our control, and the coal is mined and sold only by us or our agents. As the coal has improved the further we have got in, and being several hundred yards further in than last season, with about a hundred feet more earth over it, *the quality of Coal we mine this year will be better than ever.* Some Coals are good in one or two particulars, and defective in others; but in combining all the qualities desired in a Gas-Coal, we know of none equal to the STERLING. Getting it to this place by Railroad, a supply can be had during the Summer months, (as well as at all other times,) which is not the case with coals dependent upon high water for transportation, as are those shipped from Erie, Pa. Having increased our mining facilities, we are prepared to ship on a more extensive scale than heretofore, and should be pleased to receive your orders.

☞ Having discovered that certain unprincipled Coal Dealers are endeavoring to sell an inferior article of Coal, under the name of STERLING, we deem it our duty, as well for your interest as for ours, to notify you, that you may be on your guard in purchasing what you might think was STERLING. *There is but one Sterling Coal Mine, and that Mine we have the full and entire control of;* and Gas-Light Companies can obtain the GENUINE STERLING COAL only by ordering direct from us, or F. WELLINGTON, Syracuse, N. Y., who is our only agent for that State.

F. BUTTS & CO.

CLEVELAND, O., March 1st, 1861.

COAL-OIL & CANDLES.

CANDLES FROM COAL.—Manufactured by the New York Paraffine Candle Co. Under Meucci's Patent. The above Company having recently made great improvement in their mode of manufacture, now offer to the public a Candle superior to any other in the market. They give a softer and more brilliant light, and burn 6 hours to the pound longer than the best wax and sperm, and, considering the strength of the light, are the most economical Candles in use.

CAUTION.

As unscrupulous persons are already offering imitations of these Candles, purchasers should bear in mind, that every box sold by this Company is stamped with the annexed trade mark, to counterfeit which is felony.

For sale by all first-class grocers, and to the trade by WM. E. RIDER,
General Agent of the Company,
16 Beekman Street, New York.

STANDARD PHOTOMETRIC Candles.—Owing to a number of Applications made to me for information concerning the supply of the "Standard Sperm Canles," used in Photometrics, I have obtained a supply, from which I can furnish those who require them with full directions for use.

T. W. PARMELE,
No. 4 Irving Place, New York.

TO CANDLE AND SOAP Makers.—Processes with drawings to manufacture every kind of candles and soaps by different processes: Candles by distillation, saponification, French candles, common candles, hard and soft soaps, palm soaps; processes to bleach palm oil and make candles out of it; purification of tallow; essays on greases and soaps. Address, Professor H. DUSSAUCE, Chemist, New Lebanon, N. Y.

J. L. McREA, Dealer in Coal Oils and Lamps, Binnacle and Signal Light Oils, 139 Water street, New York.

THE LUTHER ATWOOD OIL CO.—Manufacturers of Superior Illuminating, Machinery and Binnacle Oils, Office, No. 34 Burling Slip, New York.

EMPIRE CITY CAMPHENE Works.—Aaron Seeley, Manufacturer and Distiller of Camphene, Alcohol, Burning fluid, Coal-oil, and dealer in Naval Stores of every description. 32 and 34 Burling Slip, New York.

H. RIDER & CO., New Bedford, Mass.—Purchasers and Manufacturers of Semi-Crude Paraffine. Ryder's Patent Paraffine Candles, manufactured and for sale.

NEW BEDFORD OIL CO.—Office foot of South-st., New Bedford, Manufacture Coal-Oil for Illuminating and Lubricating purposes, of the best quality.

ABRAHAM H. HOWLAND.
Our Coal-Oil will burn in all Kerosene Lamps.

HEATING APPARATUS.

JOSEPH NASON & CO., Constructors of Apparatus for Warming Public and Private Buildings by Steam and Hot Water.

Improved Fans for Ventilating Hospitals and other Public Buildings.

JOSEPH NASON,
HENRY R. WORTHINGTON,
No. 61 Beekman street, corner of Gold street, New York.

STEAM DOMESTICATED.—LOW Pressure Steam for Domestic Warming, an apparatus which is simple, durable, economical, and perfectly safe. Estimates given and work done in any part of the country.

Descriptive pamphlets furnished on application to BAKER, SMITH & CO.
Sole manufacturers, Nos. 190 and 192 Centre street, N. Y.

GEORGE L. CANNON, Successor to the Rippowam Co., 54 East 13th street, between Broadway and University Place, manufacturer and dealer in Air, Water and Steam Warming and Ventilating Apparatus, Cooking Ranges, Range Furniture, Registers, Ventilators, &c.

Particular attention given to Heating Churches, School-Houses, Public Buildings, &c.

HOT WATER GAS STOVES, Manufactured by HUNTER, KELLER & Co., 144 Centre street, New York.

See Engravings on page 163, Vol. II. of this JOURNAL.

PORTABLE GAS-WORKS.

THE AUBIN GAS-WORKS CO., No. 44 State Street, Albany, N. Y., will refer parties wanting GAS-WORKS for VILLAGES to seventeen of their Village Works now in operation in the United States and the Canadas, in *every one of which the profits of the Company are ten per cent. and upwards, and yet good Gas is furnished.* Agents wanted to extend the sale of the AUBIN PORTABLE GAS STOVE for dwellings, factories, &c., which will make 1000 feet of gas in five hours, and with greater simplicity, safety and economy, than any other known apparatus.

BUTLER'S PATENT PORTABLE **ROSIN GAS-WORKS,**
FOR
Dwellings, Churches, Country Villages,
As well as for Consumers in Large Cities.
JOHN BUTLER,
No. 112 Fulton st. and 15 Henry st., Brooklyn, N. Y.

FOR LIGHTING RAILROAD CARS AND STEAMBOATS
☞ WITH GAS.
The whole process of Filling the Gas-Holders of a Railway Train, requires but Three Minutes.
Apply to the
NEW YORK CAR & STEAMBOAT GAS. CO.,
No. 117 Fulton st., N. Y.

C. R. WOODWORTH, Manufacturer of
PORTABLE GAS WORKS,
74 WALL STREET, NEW YORK CITY.

PORTABLE GAS WORKS.—S. T. McDOUGALL'S PATENT Portable Gas Works, for making Gas from Rosin, Rosin Oil, Coal Oil, Naptha, Grease, etc. These Works combine the latest improvements in gas making, and are guaranteed to be superior to any in market. They are made of all sizes, suitable for either country or city use. No county house is complete without its Gas-Works. Gas Stoves of every description on hand and made to order. For sale by S. T. McDougall, 170 Center St., New York.

Agents wanted in other cities to sell rights or machines.

GAS FOR THE COUNTRY.—C. WOOSTER, Manufacturer of Improved Portable Gas-Machines, for Villages, Public Institutions, Churches, Hotels, Railroad Depots, Factories, Mills, Machine-Shops, Plantation Dwellings, &c. Office, 256 Canal street, near Broadway.

This Machine has been in successful operation for years, in many of the best residences and factories in the country; and for simplicity of construction, ease of management and economy of light produced, possess advantages over all other machines for the purpose now in use. It is adapted to the making of Gas from Crude Rosin or Rosin-Oil, producing a Gas of twice the illuminating power of Coal-Gas, at about one-half the price usually charged for that gas.

Every Machine is sold under a strict guarantee to operate according to representation, and no payment required until the fact is demonstrated by actual use.

For further particulars, and descriptive pamplet containing references to numerous parties now using the apparatus, address
C. WOOSTER,
No. 256 Canal st., near Broadway, N. Y.
For Engravings, see AMERICAN GAS-LIGHT JOURNAL, for June, 1860, page 245.
☞ Responsible Agents wanted, with whom liberal arrangemets will be made.

APPLETON'S IMPROVED GAS-WORKS, for Factories, Hotels, Dwellings and Towns. The most simple and economical works in use, furnishing a superior light to coal-gas at a cost of one-half a cent per burner per hour. It does not injure trees, or plate, and is not affected by cold. For Circular and Terms, apply to APPLETON & GRAHAM,
56 Washington street, Boston.
For Engravings, see AMERICAN GAS-LIGHT JOURNAL for April, 1860, page 213.

MARSH'S PATENT ROSIN OR Sun-Light Gas-Works, for Private Dwellings, Hotels, Factories, Railway stations, Sugar-houses, Towns, &c. By the peculiar construction of the Retorts, the largest amount of decomposing surface is obtained in the smallest space. 2d. Gas is manufactured from crude rosin, without the least deposit of carbonaceous matter in the retorts or pipes: thus enabling them to be operated continuously, generating rapidly the best and cheapest illuminating gas obtained from this material. ALFRED MARSH & CO.
241 Broadway, New York.

MARYLAND GAS COMPANY are constantly constructing their superior Patent
PORTABLE GAS-WORKS,
of any capacity, from that required for Private Dwellings, Public Buildings, &c., to such as will supply Cities and Towns, complete in all their parts, for the manufacture of Gas from either Rosin, Oil, Coal, or Rosin.

P. S.—This Company also manufacture a superior article of ROSIN-OIL, especially for Gas purposes. Their experience for the last nine years has secured for them a perfect success of their Gas-Works. Address
Maryland Gas Company, Baltimore, Md.

OLEOMETERS.

OLEOMETER, or HYDROMETER. For Kerosene, Coal Oils, Petroleum and other Distilled Oils. Scale by Dr. Gesner. Manufactured and sold by
G. TAGLIABUE,
298 Pearl st., New York.

IRON RETORTS.

CELLULAR GAS-RETORTS.—C. M. CRESSON'S CELLULAR Gas Retorts, Patented October 3d, 1854. Adapted to the manufacture of GAS from Rosin, Coal, Wood, &c., and now in use at the Philadelphia Gas Works. Patent Rights for sale. For information apply to HENRY S. HAGERT, Attorney for Patentee, S. E. cor. of Walnut and Sixth sts., Philadelphia, Pa.

FOR SYMME'S PATENT RETORTS, MOUTHPIECES, &c., address—
ELLIMAN BROTHERS, 217 Pearl st., N. Y.
MORRIS, TASKER & CO., Philadelphia.
Or H. K. SYMMES, Newton, Mass.
See Engravings in AMERICAN GAS-LIGHT JOURNAL for July 1, 1860, page 280.

GASOMETER RIVETS.

PHILLIPS & ALLEN, Pennsylvania Avenue, above 22d street, Philadelphia.—GASOMETER RIVETS of all kinds.

GAS AND WATER-PIPE.

W. & J. GRIFFITHS & CO.—City Tube Works, Malleable Iron and Brass Foundry, No. 27 North Seventh street, Philadelphia. Manufacturers of Wrought Iron Pipe, Lap-Welded Flues and Fittings; also, Brass Work of all descriptions, for Gas, Steam and Water. Particular attention given to Heating Buildings, &c.

PARIS'S PATENT
Glass-Enamelled Wrought Iron Tubes,
PROSSER'S PATENT
LAP-WELDED IRON BOILER TUBES.
TUBES FOR ARTESIAN WELLS, CONVEYING STEAM OR WATER, SHAFTING, &c., SCREWED OR COUPLED TOGETHER, in various ways.
THOS. PROSSER & SON, 28 Platt st., N.Y.

CAST AND WROUGHT IRON Pipe, Branches, Elbows, Sleeves, &c. Lamp-Posts, Wrought-Iron Lanterns for Lamp-Posts, Gas Retorts (clay or iron), Street Mains in 9 or 12 feet lengths. Sheet-Iron cut to pattern for Gas-holders. For sale by the Manufacturers' Agent,
HENRY G. NICHOLS, 24 Pine st., N. Y.

HUNTER, KELLER & CO., Manufacturers of
WROUGHT-IRON PIPES & FIXTURES,
of all descriptions, for
STEAM, WATER AND GAS.
144 Centre street, New York.

GIRARD TUBE WORKS—MURPHY & ALLISON, Proprietors. Wrought Iron Coke-Welded Tubes, for Gas, Water, Steam, &c. Wrought, Cast and Malleable Iron Fittings, Steam and Gas Cocks, Valves. Also, Galvanized Tubes and Fittings.
Office 1908 Market street, Philadelphia.

AMERICAN TUBE WORKS.—W. G. Smith & Co., Forty-sixth street, East of 10th Avenue, New York City. Manufacturers of WELDED IRON PIPE for Steam or Gas, of all sizes, from 1-8th to 3 inches.

JOSEPH NASON & CO., 61 BEEKMAN STREET, corner of Gold Street, New-York, Manufacturers of Wrought and Cast-Iron Pipes, and every description of Steam and Gas-Fittings used by Engineers, Manufacturers, and Gas-Fitters.

Boiler Flues,	Back Pressure Valves,
Steam Boilers,	Steam Traps,
Boiler Pumps,	Steam Whistles,
Steam Pumps,	Gauge Cocks,
Steam Gauges,	Gas Cocks,
Safety Valves,	Gas Meters,
Stop Valves,	Fitters' Tools,
Check Valves,	Proving Pumps,
Governor Valves,	Screwing Machines.

JOSEPH NASON,
HENRY R. WORTHINGTON.

PATENT RIGHTS.

INVENTORS' DEPOT AND SALES Room for Patent rights.—Parties desirous of placing with us valuable Patents, for the sale of Rights, on commission, will here find the Head-Quarters for Inventors and their Patents, as well as for parties seeking investments in articles of undoubted merit. The public are invited to call, or send for circulars. New articles coming in daily. BUTLER, HOSFORD & CO.,
No. 30 Broadway, N. Y., Proprietors of the Paragon Self-Generating Gas-Light.

ROOFING.

PATENT ASPHALTE ROOFING and SHIP SHEATHING FELTS, the cheapest, best, and most durable ever offered to the public. Circulars, samples, &c., will be forwarded free. Agents wanted for city and towns. None genuine unless purchased of AARON A. DE GRAUW, 242 South street, our sole agent for the United States.
CROGGON & CO., London.

PLUMBERS & GAS-FITTERS.

LOCKE & CRAIGIE, PLUMBERS and GAS-FITTERS, No. 12 East 20th street, New York.

LOCKE, CRAIGIE & CO., Gas-Fittings, Chandeliers, Brackets, Globes, &c., No. 927 Broadway, New York.
☞ Particular attention paid to country work.

JAMES HELME'S CHANDELIER AND Gas-Fitting Establishment, No. 58 East Thirteenth street, between Broadway and University Place, New York.

BRADBURY M. JOHNSON, GAS-FITTER and PLUMBER, No. 111 East Eighteenth street, New York.

A large and elegant assortment of CHANDELIERS, BRACKETS, &c. Gas-Pipe and Posts made for Gas Companies on favorable terms.

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Water Closet Pans, Wine Basins, Wash Basins, Sinks, Fountains, Jets for public and private purposes, Stop-cocks, Filters, and all other Water Apparatus.

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THE BEST GAS-BURNER YET INVENTED.
They are self-regulating, gas-purifying, indestructible, and most economical.
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PERFECTION.—This recent Improvement in Gas-Burners embraces the great economy of the Hicks Patent Burner, a gain of over 75 per cent. in light. This Burner is now offered to the Trade and all consumers of gas, at the price of the common burner. It is anti-corrosive, gives a uniform and beautifully-shaped blaze, under any pressure, and will not get out of order.

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Street Lanters cast in three pieces, which are fitted together without bolts, rivets, solder, or other fastenings; glazed without tins, putty, or catches; the glass slipping into grooves cast in the lantern. These lanterns have been adopted and are now used by the City Councils of Cincinnati, O., Covington, Ky., and other cities.

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FLUID FOR GAS-METERS.—The undersigned is prepared to furnish the Glycerine Meter Fluid in quantities to suit purchasers. *It does not evaporate, can be made to stand any degree of cold liable to occur in this country or in Canada, and does not corrode the metals of the meter. It has been in use successfully for the last three years.*

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GAS ENGINEERS' LIBRARY.—A few works indispensable to Engineers, Contractors, and others engaged in the construction of Gas-Works and manufacture of Gas, have been selected, out of a large stock of chemical and other works, and are recommended to the attention of those interested. See page 208, vol. II, of this JOURNAL.

For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, New York.

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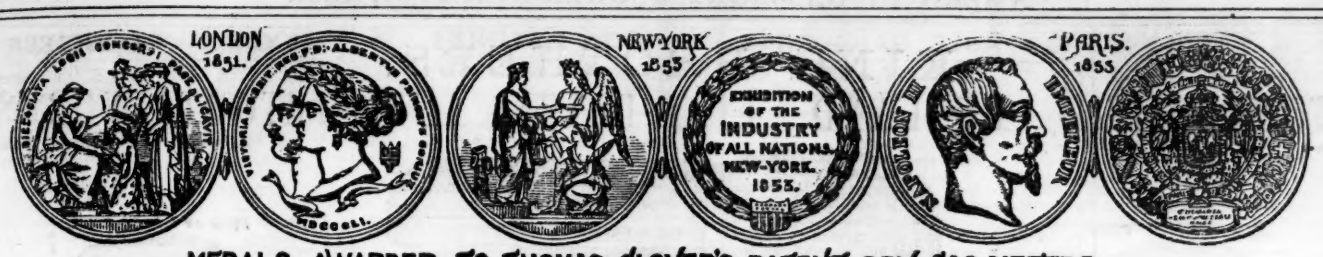

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Thomas Glover's Meters have now been in use in the United States and British Provinces, for the last Fourteen Years, and are extensively used by many Gas Companies, to their entire satisfaction; and R. Glover can with all confidence refer to them in proof that Thomas Glover's Meters are— the most Perfect in Principles— the most Correct in Registration—and more Durable than any other Dry Gas Meter made in the United States or Great Britain. R. Glover will at all times be glad to repair any Gas Meters sent him at the above factory. If any of them are of Thomas Glover's manufacture, and of a more recent date than Three years, he will make no charge.

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MANUFACTURERS OF

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Pressure-Registers, Pressure-Indicators and Gauges, Station, Show, Customer, and Experimental Gas-Meters, Centre or Hydraulic Valves, Governors, Compensators for Exhausters, and the Standard, Testing Gas-Holders* for Proving Meters, now used in the State of New York in compliance with an Act of the Legislature.

ALSO, BUNSEN'S PHOTOMETER, WITH COMPLETE APPARATUS FOR WORKING THE SAME.

* The standard of measurement of this Gas-Holder is given by Professors Torrey, of the U. S. Assay Office; Joy, of Columbia College; Gibbs, of the Free Academy, and several other distinguished scientific gentlemen.

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All of our Work is Guaranteed to be of the First Quality, as well as the material, and for this we can refer to numerous Gas-Light Companies.

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GAS-METERS,

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GAUGES,

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FLUID GAUGES, &c.

The flattering Testimonials we are receiving from Gas Officers, accompanied with expressions of such general satisfaction, and the fact of a tried experience for fourteen years, must present itself as a security to parties desirous of securing the most reliable Instruments. We therefore recommend our Patent Dry Gas-Meter, believing it superior to any Meter manufactured. Messrs. J. Lennig & Co. confine their sole attention to the business of Gas-Meter making.

Our materials are the best in use; the strictest attention is given to workmanship, and we guarantee entire satisfaction to all purchasers.

Purchasers may at any time inspect our Works, and the materials of which our Meters are manufactured. We are fully prepared to execute all orders, upon the shortest notice, and it will be to the interest of parties to call upon us.

☞ **Each Meter Tested Separately by a Sworn Inspector, and Sealed when desired.** ☜

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KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

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RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

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The high reputation which we have enjoyed for more than twenty-two years, and the fact that we have manufactured a greater number of Gas-Meters than all other manufacturers in this country combined, must present itself as a security to parties desirous of securing the most reliable instruments. Having completed a most extensive addition to our Factory, and added many important improvements to our machinery, we are enabled to fill orders entrusted to us with despatch, and in all cases *guarantee entire satisfaction*. Our Patent Rotary-Valve Dry Gas-Meter is now used by upwards of Two Hundred Gas Companies, giving general satisfaction; we therefore recommend it, believing it superior to any other Dry Gas-Meter manufactured. All Meters tested separately by a sworn Meter-Inspector, and sealed when desired.

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Warranted Equal to the Best English Pipe.

EDWARD COCKEY & SONS'
PATENT GAS-VALVES.

These Valves are formed of two Cast-Iron Cylinders, with segmental divisions, having the faces ground gas-tight—the upper cylinder turning horizontally on the lower one.

The lower Cylinder has pipes from each division, communicating with the vessels to and from which the gas is to be passed. The upper Cylinder has corresponding divisions, so arranged as to direct the passage of gas to the different segmental divisions in the lower part, and when it is turned on the face of the lower one, to alter the flow of gas from one vessel to another.

Each valve has an index-plate provided, which is to be attached to the floor, and a pointer on the cover of the Valve shows which way it is turned. Thus, the Manager of the Works can at once see in which direction the gas is passing.

There are about fifty of these Valves now in use, of sizes varying from two to twelve inches, and they are giving great satisfaction. Amongst the Works at which they are fixed, the following may be mentioned:—

BASINGSTOKE,	CHELTENHAM,	ENNISCORTHY,	FROME,	NEWPORT,	SANDWICH,
BLANDFORD	CANTERBURY,	ELGIN,	GODALMING,	RYDE,	WARMINSTER.

They are in course of erection at other important Works.

IRON WORKS, FROME SELWOOD, ENGLAND.

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ALSO MANUFACTURE

Purifiers, Scrubbers, Condensers, and other Improved Gas Apparatus,

HAVING PATTERNS SUITABLE FOR GAS-WORKS OF DIFFERENT SIZES.